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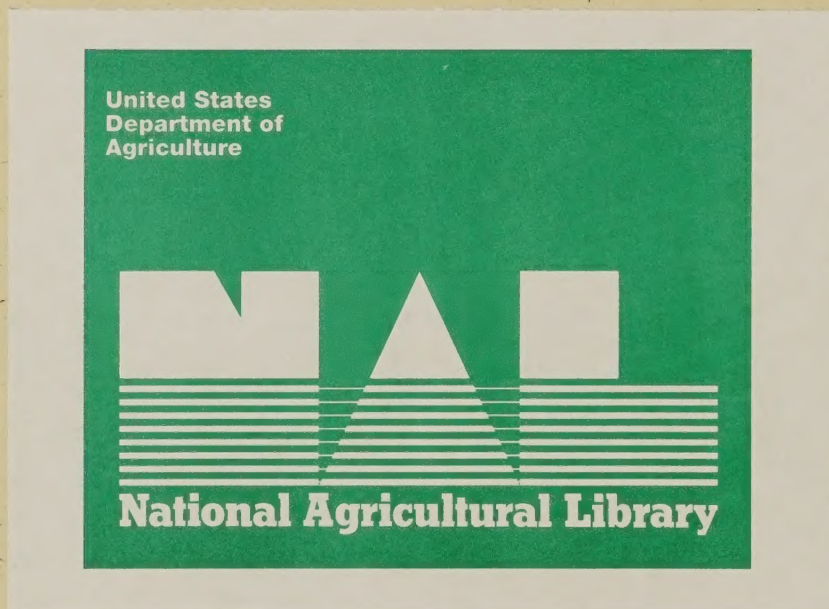
# Whale Rock Forest Health Multi-Resource Project

## Draft Environmental Impact Statement





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# **DRAFT ENVIRONMENTAL IMPACT STATEMENT**

## **WHALE ROCK FOREST HEALTH MULTI-RESOURCE PROJECT**

### **ELDORADO NATIONAL FOREST PACIFIC RANGER DISTRICT**

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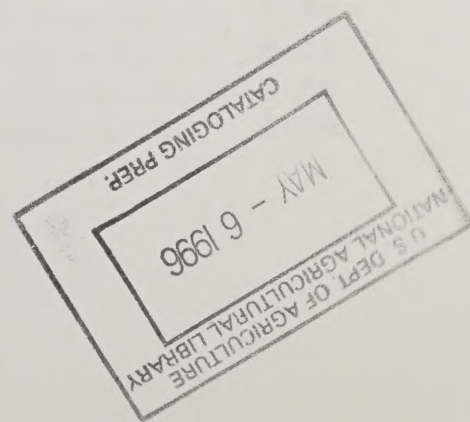
#### **ABSTRACT**

The Pacific Ranger District of the Eldorado National Forest has developed five alternatives for managing the Whale Rock Analysis area of El Dorado County, California. Alternatives have been developed to respond to agency and public issues identified during the scoping process. Objectives for the area include improving forest health through the reduction of fuel loads and fire hazards and improving wildlife habitat. Implementation would begin in 1996.

Alternative A, No Action, would allow no activities to reduce fire hazards or enhance wildlife habitats. Alternative B emphasizes reducing fire hazards through fuels manipulations (prescribed burning; commercial thinning; biomass removal) and the construction of shaded fuelbreaks. Alternative C provides for sustainable wildlife habitat through fuels reduction, commercial thinning and biomass removal, while also allowing for thinning and burning within Protected Activity Centers (PACS). Alternative D addresses the issue of harvesting timber (commercial thinning and biomass removal in plantations and natural stands) to aid in fuels reduction and to meet current and future timber demands. Alternative E integrates elements of Alternatives B through D to meet wildlife, fire and timber objectives.

Alternative E is the preferred alternative.

Comments must be received by: MAY 28 1996.





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## **SUMMARY**

### **DRAFT ENVIRONMENTAL IMPACT STATEMENT**

#### **WHALE ROCK FOREST HEALTH MULTI-RESOURCE PROJECT**

**ELDORADO NATIONAL FOREST  
PACIFIC RANGER DISTRICT**

#### **PURPOSE AND NEED FOR ACTION**

The Forest Service proposes remedial, restorative and preventative treatment and management actions in order to improve forest health and re-establish a sustainable landscape condition on public lands within the Whale Rock area on the Pacific Ranger District of the Eldorado National Forest (see Figure S-1). The Pacific Ranger District proposes to implement activities to reduce fuel loads and fire hazards, and to improve wildlife habitat and timber growth, while considering effects on other resources and activities.

The Whale Rock Forest Health Multi-Resource Project Draft Environmental Impact Statement (EIS) considers actions intended to improve and restore the forest health of the analysis area. Areas of proposed activities are now composed of dense understory thickets of white fir and incense cedar that are nearly impenetrable to a person on foot. Current vegetative conditions differ so markedly from the historic condition that it is possible to conclude that the current stands exceed the historical range of variability in terms of ecosystem structure and process. The structure of the current forested landscape represents an unstable, unsustainable and therefore undesirable departure from the historical range of variability for this area.

The abnormally high levels of tree mortality that have occurred within the Whale Rock project area and the recently experienced extreme fire behavior on adjacent lands similar to the Whale Rock area provide ample evidence that the analysis area is in a high risk condition. Areas such as the Whale Rock project are at a critical juncture; nature's response to the conditions within the Whale Rock project area has been clearly evidenced on the Pacific Ranger District and numerous similar locations throughout the west in the form of catastrophic levels of tree mortality caused by the combined effects of insects, drought and wildfire. The effects have been dramatic and severely detrimental to the diversity, distribution and viability of plant communities, wildlife and fisheries. Substantial damage to watersheds and valuable improvements, as well as enormous commodity losses, are additional problems associated with forests that are in an unhealthy state.

The vegetative conditions that presently exist within the Whale Rock analysis area have been primarily created by the preclusion of both natural fire regimes and past (pre-European) burning practices, and the initiation of timber management practices. The interplay of these three factors has occurred over a period of many decades. The restoration of the Whale Rock analysis area to a more natural, healthier condition will require appropriate management that will extend into the 21st century. It is the purpose of the Whale Rock Multi-Resource Forest Health project to begin the process of restoring and maintaining the health, resilience and sustainability of the desired vegetation of the Whale Rock area and in so doing, improve, maintain and perpetuate the other dependent resources, as directed in the Eldorado National Forest Land and Resources Management Plan (LRMP 4-1 to 5).

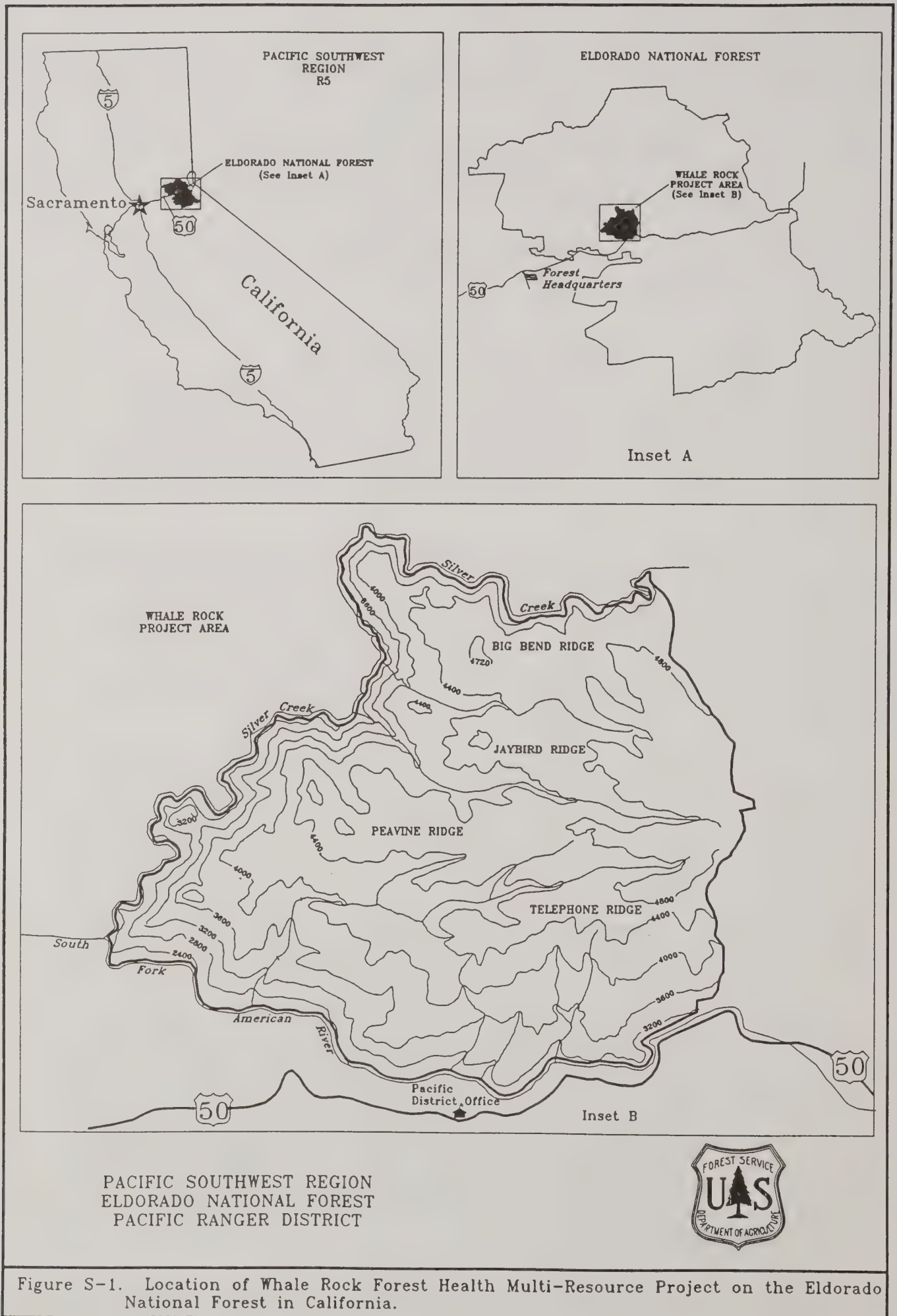


Figure S-1. Location of Whale Rock Forest Health Multi-Resource Project on the Eldorado National Forest in California.

There is also a need to identify timber that can be used to replace timber sold in 1992 in the Cox Canyon Timber Sale. As a result of concerns expressed by the public regarding the adequacy of the environmental analysis for the Cox Canyon Timber Sale, a review of the environmental documentation for the sale was initiated in December 1992. The review included analyses of cumulative effects on watersheds, California spotted owl, Pacific fisher, and late-seral forests, as well as other resources. The results of the review indicated that the Cox Canyon Timber Sale, as currently planned and in combination with other sales, would not support future management options for the California spotted owl. The review led to the decision to seek an environmental modification of the existing contract for the Cox Canyon Timber Sale and secure replacement volume for the modified units. A summary of the findings from this review is located in Appendix I. Land delineated by the legal description of the Cox Canyon Timber Sale falls within the area analyzed in the Whale Rock Forest Health Project Environmental Impact Statement; therefore, volume in the sale area is covered within this EIS. It is anticipated that some portion of the timber products identified in this EIS would be applied to replacing volume from the Cox Canyon Timber Sale.

### **DESIRED CONDITION**

The desired condition for the Whale Rock project area is a forested landscape that has a low risk or probability of a large-scale catastrophic fire while sustaining a viable, healthy ecosystem that supports endemic plant and animal populations. The desired condition for the majority of the Whale Rock area can best be described by paraphrasing descriptions of western forests offered by early observers:

The forest structure is even-aged by small, irregular groups of trees and is patchy and broken; and immune from extensive crown fires. The forest floor is open and parklike. Large individual trees are abundant; small groups of uniformly sized young growth occur in openings. Ponderosa pine is the dominant tree species, although sugar pine, Douglas fir, white fir and incense cedar are also present. Scattered throughout the landscape are patches of oak hardwoods and brush. The forest productivity appears sustainable and healthy. Dead or dying trees and large down logs are present, but not common. The inviting openness of the forest is the most distinguishing feature (extracted from Biswell 1989).

### **PROPOSED ACTION**

The action proposed on the Whale Rock Project includes the commercial thinning of 19,492 MBF of sawtimber from a total of 3,679 acres. In addition, 49,565 tons of biomass will be removed. Fourteen and one-half miles of shaded fuelbreaks will be constructed, centered primarily atop Big Bend, Jaybird, Telephone and Peavine Ridges. A total of 2.2 miles of new road will be constructed to access activity areas. Post-harvest prescribed burning will be conducted on 4,510 acres and post-sale fuels treatment by tractor piling will occur on 777 acres. Harvest activities will begin in 1997 and post-harvest fuels treatment will extend for seven years after harvest is initiated. These activities are described in detail in Chapter II, Alternative E. This proposal best meets the purpose and need for action, and the desired condition for the Whale Rock Area.



### **DECISION TO BE MADE**

The interdisciplinary team (IDT) has considered five alternatives in detail, including a No Action proposal. The action alternatives are all designed to begin the process of re-establishing a healthy, sustainable forested condition. The decision that now needs to be made is whether to implement the proposed action (Alternative E), or one of the other alternatives, in order to meet the defined objective of improving the forest health, as measured by the various managed resources within the project area.

### **AFFECTED ENVIRONMENT**

The Whale Rock Analysis Area lies within the Pacific Ranger District of the Eldorado National Forest. The analysis area covers approximately 18,000 acres bounded on the south by the South Fork of the American River, on the west and north by Silver Creek, and on the east by the western margin of the area burned in 1992 by the Cleveland Fire. The project area is located entirely in El Dorado County in Township 11 N, Range 12 E, in all or portions of Sections 12, 13 and 24 (MDBM); Township 11 N, Range 13 E, in all or portions of Sections 1-24; Township 11 N, Range 14 E, in all or portions of Sections 6-7, 18-19, and 30; and Township 12 N, Range 13 E, in all or portions of Sections 28-29 and 32-36. Elevations range from 2,080 feet at the confluence of Silver Creek with the South Fork of the American River to 5,080 feet on Peavine Ridge on the east edge of the project area. The area is accessed from Highway 50 by the Icehouse Road (Primary Forest Route 3), White Meadows Road (County Road 11N65/11N64) and Peavine Ridge Road (Forest Road 11N63).

#### ***GEOLOGY AND SOILS***

Approximately one half of the area is underlain by Miocene and Pliocene rocks of the Mehrten Formation. These volcanic mudflows cap the broad ridges in Whale Rock. Open rocky areas on the Mehrten are referred to as lava caps in this document. Remaining areas in Whale Rock are comprised of Mesozoic granitic rocks and Paleozoic Rocks of the Shoo Fly Formation. Soils are derived from these geological substrates and include five mapped units (Cohasset-McCarthy-Crozier; McCarthy-Ledmount; Jocal-Mariposa; Chaix-Pilliken-Holland; and Rock Outcrop-Maymen-Lithic Xerumbrepts).

#### ***HYDROLOGY***

The project area is located in an area having a Mediterranean climate, with abundant sunshine in the summer and moderate to heavy precipitation in the winter. Average annual precipitation ranges from 50 to 60 inches, 85% of which falls between November and May as rain and snow. The area is within the South Fork American River Basin. The 179,703 acre lower section of the South Fork (LSFAR) contains the seven watersheds that encompass the Whale Rock Analysis Area. The South Fork of the American River and Silver Creek are Class I streams. Class II streams include the lower portions of Soldier Creek, Round Tent Canyon Creek, Jaybird Creek and Brockliss Creek. There are some small (less than 1/10 acre) wetlands in the form of springs or seeps within the project area. For the most part, the Whale Rock project area is quite dry, and most of the riparian areas are directly associated with perennial and intermittent streamcourses, such as the lower and upper reaches of Jaybird, Soldier and Round Tent Creeks.

## VEGETATION

Sierra Nevada Mixed Conifer and Ponderosa Pine are the principal forest cover types within the naturally regenerated stands of the Whale Rock area. The understory is dominated by dense, shade tolerant white fir and incense cedar saplings and small poles. Black oak is present across the majority of the project area. In a number of locations, young stands of black oak are the dominant tree species.

The average age of the natural stands within the project area is generally around 130 years, if the dense understory (which is approximately 30-80 years of age) is not considered. Scattered across the project area are many trees that exceed 300 years of age. The Whale Rock project area contains 1,995 acres (13.8%) late seral forest habitat.

The 1,400 acres of existing plantations within the Whale Rock area were planted primarily to ponderosa pine, although the plantations established during the early 1960s consist of a mix of ponderosa pine and a Jeffrey/Coulter pine hybrid in some instances. Plantations established since the mid-1980s were commonly planted with a 30-50 percent Douglas-fir component.

No Federal proposed, threatened or endangered plant species are known to exist in the analysis area. Four sensitive plants have been found in the area. These include the Pleasant Valley mariposa lily (Calochortus clavatus var. avius), yellow bur navaretia (Navaretia prolifera ssp. lutea), saw-toothed lewisia (Lewisia serrata) and Stebbins' phacelia (Phacelia stebbinsi). Three Forest Special Interest plants, the woolly violet (Viola tomentosa), Pacific yew (Taxus brevifolia) and Sierra sweet bay (Myrica hartwegii), are known to exist in the analysis area. Special Interest species make up a Forest Watch List of plants that, although not currently rare, may become so in the future.

Exposed, rocky areas on the lava cap occasionally support "sub-community" plant associations. These lava cap habitats, varying from one to more than 100 acres, commonly provide habitat for the sensitive plant species Lomatium stebbinsi, Calochortus clavatus var. avius, and Navaretia prolifera ssp. lutea. Many species of the Liliaceae and Amaryllidaceae genera are perennials in these areas. Canyon live oaks may be present, but usually occupy no more than 3% of the area. The plant community flowers in a six month sequence, beginning in March. During this period, the large numbers of herbaceous plants create a meadow-like appearance in this area. Outside of the flowering season, the lava caps appear to be rocky, barren areas surrounded by chaparral.

## FISH AND WILDLIFE

In general, habitat quality is moderate to poor for most species of concern occurring within the project area. The U.S. Fish and Wildlife Service listed the peregrine falcon as an endangered species that could occur in the area. A proposed threatened species, the California red-legged frog, and two threatened species, the bald eagle and the valley elderberry longhorn beetle, are also considered to potentially occur within the project area. Two additional species, the threatened Delta smelt and the proposed Sacramento splittail, could potentially be affected by forest activities.

Eight sensitive species are also identified for the Eldorado National Forest, including California spotted owl, northern goshawk, great grey owl, willow flycatcher, marten, fisher, Sierra Nevada red fox and northwestern pond turtle. The Eldorado LRMP identifies ten management indicator species (MIS) used in the analysis and monitoring of forest activities (peregrine falcon, bald eagle,



willow flycatcher, spotted owl, goshawk, deer, black bear, mountain quail, cavity nesting birds and trout). A Biological Evaluation (BE) was completed for this project to evaluate potential effects on federally listed threatened, endangered and proposed species, and on Forest Service sensitive species. The BE determined that the marten, great grey owl, Sierra Nevada red fox, bald eagle and peregrine falcon lack habitat within the Whale Rock area. The BE also found that Delta smelt and Sacramento splittail will not be affected by project activities, since the minimal amounts of silt that may be generated as a result of activities in Whale Rock will be trapped behind dams along the American River. In addition, an analysis for MIS species was completed. Project activities have been designed in part to enhance habitat for spotted owl, northern goshawk and the Pacific deer herd.

Some of the protected activity centers for owls in Whale Rock have stands with a dense understory of young incense cedar and white fir. These areas present a hindrance to the foraging efforts of spotted owls. They are also at an increased risk of timber stand-replacing fires due to heavy fuel loads and ladder fuels. Similar habitat restrictions exist within the two northern goshawk management areas (GMAs), and the proposed GMAs, located within the project boundary.

The project area is within the winter range and critical winter range for the Pacific deer herd; the area is also a holding area (an area where deer concentrate during a major migration) and a major migration corridor. In 1992, the Cleveland Fire burned approximately 13% of the critical winter range for this herd and also the major migration corridor that leads to summer range and fawning areas. Habitat found within the project area is considered medium quality due to overmature brushfields and dense thickets of understory that impede movement of deer through the area. Project activities have been designed to improve the habitat for the Pacific deer herd.

#### *FIRE AND FUELS*

Since 1958, there have been 43 forest fires in the Whale Rock Project which have burned a total of 7,221 acres, or more than one third of the entire project area. Of these, 28 were person-caused (65%) and 15 were caused by lightning (35%; or one lightning-ignited fire every 2.4 years). Seven of these fires exceeded five acres in size, six of these person-caused. The burn rotation (the interval at which each acre will burn in years) for the Whale Rock area is now 90 years. By contrast, the burn rotation for the Eldorado National Forest is 447 years, indicating that when fires start in the project area, they tend to be larger than those burning on the remainder of the Forest. Since 1958, a large fire (over five acres) has burned inside the project area on an average of every 5.1 years, with an average of 201 acres burning annually.

Current fire management direction for the area is to control 97% of all wildfires within a 10 acre maximum size limit. Over the past 36 years, 14% of the fires have exceeded this size limit. Four of the seven large fires burned at such high intensities that nearly 100% of the trees inside the burns were killed. Fuel loadings, dense thickets of trees and brush, and well developed fuel ladders are the primary reasons large stand-replacing fires are becoming the norm in this area.

Of additional concern from a fire management standpoint are the recent residential developments taking place along the White Meadows Road. These residences are located on south-facing mid-slopes, the worst possible location for development to take place from a fire control perspective. Overhead power transmission lines to these homes caused two of the seven large fires in the last 36 years. As these parcels continue to split and be sold, the number of

private land holders will continue to grow, and the number of person-caused fires is expected to rise.

Another condition of the Whale Rock area that affects fire and fuels is the number of standing snags throughout the analysis area. After seven years of drought, thousands of snags are located throughout the Whale Rock area. Snags are a major contributor to long range spotting when a wildland fire occurs and present a serious safety hazard to fire personnel (eleven wildland firefighters have been killed by falling snags since 1987 in California and at least a dozen more have suffered serious injury). Snags are also a serious safety hazard to the general public; five forest visitors were killed by falling snags on National Forest lands in California in 1993. The number of snags in Whale Rock is so high that District fire and fuels management experts believe that forest roads can no longer be considered effective or safe locations for backfiring during fire suppression efforts. This is in stark contrast to earlier conditions, when roads were always considered among the first lines of defense in suppressing wildland fire, both for access to fires and as fuelbreaks.

#### *AIR QUALITY*

The proposed project is within the Mountain Counties Air Basin, which is a Class II airshed. Desolation Wilderness, 14 miles east of the proposed project area, is a Class I airshed. Monitoring is not done within Desolation Wilderness for visibility; however, public reports indicate visibility is good to excellent most of the time within the Wilderness. Air quality is good most of the year in Pollock Pines, a small community of 4,000, located one mile southwest of the proposed project area. Placerville, with a population of over 9,000, lies 13 miles west of the proposed project area. Air quality is good most of the year in Placerville, although the town is affected by wood smoke from fireplaces during the winter season. Placerville also has reduced visibility to the west from the Sacramento metropolitan area during summer.

#### *VISUAL RESOURCES*

There are two viewsheds that affect the planning area: Highway 50, a California State Scenic Highway, and the South Fork of the American River. The Visual Quality Objectives for both of these viewshed corridors are Retention for the foreground views and Partial Retention for the middleground views. These views are currently natural appearing (EVC I and II) with some minor landscape alterations (EVC III) evident from Highway 50. These alterations are primarily the result of the dense even-aged pine plantations that were planted in 1960-1961 after the Ice House fire. In general, the foreground and middleground views have a moderate visual variety due to the pockets of older mixed conifer stands that survived the fire and the patterns of brush and open rocky areas that occur in the seen areas. The rest of the planning area is seldom seen and has a VQO of Modification.

#### *RANGE*

Two range allotments, separated by an allotment boundary fence, are situated within the Whale Rock area. The Soldier Creek Allotment is entirely within the project area. This allotment has been vacant since 1988. The second allotment, Big Hill, is shared by two permittees. Roughly 10 percent of the Big Hill Allotment is within the eastern portion of the Whale Rock area. Both allotments are considered to be transitory range. Primary browse in transitory range includes deerbrush, whitethorn and manzanita.



## RECREATION

The Whale Rock Analysis Area provides for recreation opportunities with low to moderate interaction between users. There are no developed public facilities and only light to moderate dispersed recreation use of the analysis area. The majority of use consists of dispersed camping during hunting season. Light use of the area also occurs by hikers, recreational gold panners and prospectors, wildflower enthusiasts, mushroom collectors, persons driving off-highway vehicles (OHVs), persons fishing, motorcyclists, mountain bicyclists and equestrians. A portion of the South Fork of the American River in Whale Rock is eligible for consideration for inclusion into the National Wild and Scenic Rivers System as a Recreation Classification river. There are approximately 58 miles of unpaved transportation system roads designated for OHV use in the Whale Rock Analysis Area. There are no system trails, although the recently designated National Historic Trail (the Pony Express Trail) crosses the project area.

## CULTURAL (HERITAGE) RESOURCES

The analysis area contains evidence of human activity over a long period of time, with the primary use occurring within the last 4,000 years. Archaeological surveys in the analysis area have resulted in the location and recording of a total of 73 sites, 13 of which are known to be situated entirely on private lands. Forty-seven of the 73 sites in the analysis area are prehistoric (i.e., Native American), 19 are historic (i.e., Euroamerican), and 7 have mixed prehistoric and historic components. The prehistoric sites range from complex temporary campsites showing a wide range of human activities to locations where a single-episode event occurred. Historic remains, which date from the 1850s, include cabins and other ranch-related features, hydraulic mines and water diversion facilities, historic trails and wagon roads such as the Pony Express Trail, and toll houses and stage stops associated with the early wagon roads. None of these sites are currently listed on the National Register of Historic Places.

## HISTORICAL LANDSCAPE DESCRIPTION

Native Americans in California frequently set fire to areas for a variety of reasons – for example, to increase forage (particularly for deer) and improve game habitat; to facilitate travel; to clear areas around habitations; to improve wild seed crops; to maintain or enhance the distribution of oaks; to kill insects and pests; and to maintain springs and surface waters. This deliberate setting of fires would have created a more open landscape with less underbrush and a more even spacing between trees. Shade intolerant species would have been favored over those that are shade tolerant and pine would increase at the expense of incense cedar and fir. Black oak stands would have been more extensive. Deer and other animals responding to the increase in forage or open terrain would proliferate. Most importantly, these periodic fires would have removed ground fuels and fuel ladders in different areas every few years and provided a more open landscape that was resilient to catastrophic wildfires.

The deliberate setting of fires continued with the influx of cattle and sheepmen into the Sierras in the mid- to late 1800s. Sheepmen set fires to facilitate the movement of flocks; dairy ranchers to increase forage in pastures. Setting of fires by sheepherders was so prevalent, in fact, that travel in the late 1800s was often hampered in autumn by dense smoke. The late 1890s brought the first attempts to suppress fires.

At least two effects of fire exclusion as a policy can be witnessed on the landscape. The first of these involves changes in distribution of vegetation in areas no longer subject to periodic

burning. As fire suppression increased through time, so too increased the density and cover of conifer species; black oak and pine stands decreased, and shade-tolerant and fire-intolerant conifer species increased. The second effect involves the rapid increase of fuel loads resulting in a dramatic increase in catastrophic fires. Increased fire intensities have resulted in greater damage to timber, soils, watersheds, wildlife and property.

The character of the existing timber stands in Whale Rock has been greatly influenced by historical and recent management activities. The primary influencing activities are the limited size of most naturally occurring fires due to suppression activities, the presence of stand-replacing wildfires, timber harvests and to a much lesser extent, disturbance associated with the gold mining era of the 1800s. In the mid to late 1970s, a considerable number of overstory removal harvests occurred that tended to dramatically reduce the numbers and distribution of large overstory trees, typically ponderosa and sugar pine. Tree mortality caused by insect epidemics and drought have been a regular feature of the analysis area for the last two decades. In 1976-1978, extensive drought-related tree mortality occurred, with tree losses predominantly confined to the large old-growth ponderosa and sugar pine. In the 1987-1994 drought, heavy levels of mortality occurred in the dense white fir stands that were approximately 75 to 100 years of age.

Based on aerial photos from the 1940s, the Whale Rock project area was historically comprised of much more open habitat types. The area was dominated by ponderosa pine stands with less than 50% canopy closure. These stands often had an understory of low lying grass and forbs. Also occurring throughout the area was the montane hardwood conifer type. Areas included black oak and ponderosa pine intermixed in pure stands, with the pines forming the dominant overstory and oaks providing the understory. The Sierran mixed conifer type was concentrated in drainages and on north facing canyon slopes. These stands were dominated by large sugar pine, incense cedar and ponderosa pine trees with an understory including dogwood, alder and yew. Pure hardwood and pure montane chaparral occurred in patches throughout the area.

A key assumption in maintaining biodiversity states that if processes are sustained in some proximity to what existed under "natural" conditions, then the dependent components and resulting structures will persist. One method for conserving the microscopic component of biodiversity, made up of organisms about which we know very little, is to conserve the vegetative communities that naturally occur in the area, with their diversity of seral stages, structures and species compositions. Management designed to maintain key ecological elements within their natural ranges of variability is most likely to produce sustainable ecosystems. Open stands of ponderosa pine are more fire-tolerant and less susceptible to insects and disease. If the Whale Rock area were returned to its historical character, the result would be a healthier, more resilient, sustainable forest.

#### *SOCIOECONOMIC ENVIRONMENT*

Any healthy economy must be based upon sound environmental practices and the sustainable industries those practices support. The costs of "poor" forest health include the cost of fire prevention, fire suppression and foregone commodity values. For example, at suppression costs of \$1,000 per acre, it would cost \$18,000,000 to suppress a catastrophic fire if the total project area were to burn.

The Twenty-five Percent Receipts Funds Act requires that 25% of all funds received during any fiscal year from each National Forest are paid to the counties in which the Forest is located.



Payment is divided among all counties occupied in proportion to the National Forest area within each county. The receipts the counties receive from this allocation are mandated to be used for the benefit of public schools and public roads. Twenty-five percent of any funds derived from the sale of products from the Whale Rock Project would be returned proportionately to Alpine (8%), Amador (12%), Douglas (less than 1%), El Dorado (73%) and Placer (7%) counties.

## **ISSUES**

On March 2, 1994, a Notice of Intent to prepare this environmental impact statement appeared in the Federal Register. On March 10, 1994, a letter was sent to 128 persons or organizations, extending an invitation to attend an open house on March 29 in the community of Pollock Pines. Forest users, government agencies, elected officials, persons living within the analysis area or known to be interested in the area, and the general public were solicited for comments. Eleven individuals attended the open house and another five people provided written comments during this initial scoping period.

The IDT documented all issues raised by the agency and the public throughout the environmental analysis. As new issues emerged or new information was field verified, the team worked together to make adjustments that responded to the new data. During the analysis, some issues were included in all of the alternatives and since these were included in the design of each alternative, they were not considered major issues that drove the alternatives. Additionally, similar issues were combined during the analysis process. Thirteen issues were identified as described below. Issues 1 - 5 contribute substantially to a difference between the alternatives, while mitigation measures have been built into the "action" alternatives for Issues 6 - 13.

**1. Reduce the risk of stand-replacing fires --** To be effective, a sufficiently large area needs to be treated to reduce the likelihood of a stand-replacing fire. Treatment of small, isolated areas to reduce stocking and ladder fuels tends to be ineffective in altering fire in a large catastrophic fire situation.

**2. Minimize cumulative effects to natural resources --** Since a large area needs to be treated to assure that it is safe from catastrophic fire and/or insect epidemic, the amount of disturbance caused by proposed activities may have the potential to cause undesirable cumulative effects, including impacts upon vegetation, riparian areas, soils, watersheds and wildlife. It is simultaneously recognized that the greatest potential impacts to all resources within the Whale Rock project area would occur with a large stand replacement wildfire, similar to the one which occurred in the south half of the project area 30 years ago.

**3. Reduce the risk of fire from and to private residences --** The presence of numerous private residences within an area designated as a "high fire hazard" zone is an issue. Should a wildfire occur on National Forest lands within the vicinity of the residences, limited fire control resources would be placed in a role of protecting the private structures rather than fighting the wildfire. In addition, private residences may serve as a location for potential accidents that would lead to a wildfire that would rapidly move onto National Forest lands. By reducing the potential severity of a wildfire on National Forest lands, the issue regarding the presence of an urban interface is greatly reduced.

**4. Balance the wildlife need for snags with the public/forest worker risks from snags --** The need to find the proper balance between the human safety risk and the wildlife benefits of

high numbers of snags is an issue. Seven years of drought have resulted in unusually high numbers of snags. Snags provide unique and valuable wildlife habitat, yet because of their numbers and adjacency to roads, snags also present potential high risk situations to the forest visitor or forest worker. Falling snags have caused numerous severe injuries and deaths in the last several years in California, both to members of the public and wildland firefighting crews.

**5. Maintain rural economic vitality --** The sale of timber from the Sierra Nevada National Forests has declined substantially during the last decade. As a result of the lack of new sale offerings on the Eldorado National Forest in 1994 and 1995, local and regional concerns have been raised about the apparent absence of a "sustained yield" of periodic output of timber supply from the Eldorado National Forest. Mill closures, localized direct and indirect timber related unemployment, and substantial decreases in national and county receipts because of the depressed sale program have been identified as substantial and inter-related issues. Opportunities exist in the Whale Rock project area to improve and protect forest health while simultaneously producing timber products that will meet a portion of the continuous demand for timber for the use and necessities of the general public.

**6. Maintain or enhance late seral (old growth) habitat conditions --** Disturbance by harvest operations, prevention of snag development, removal of snags and downed logs and reduction in overall stand density may negatively affect some wildlife species. By implementing appropriate stand prescriptions it is possible to protect or enhance those stand characteristics that are most valuable to late seral wildlife species, such as the goshawk, spotted owl and furbearers. By initiating stocking control, it is possible to increase the growth rates of selected residual trees, thereby attaining old growth-sized trees more quickly.

**7. Maintain or enhance early seral habitat conditions --** Much of the Whale Rock project area functions as critical winter deer range. By implementing appropriate stand prescriptions it is possible to protect and/or enhance those stand habitat characteristics that are most valuable to early seral wildlife species, such as mountain quail and deer. The creation of more open timber stands favors the germination and development of young, succulent grass, forb and brush species. The increased availability of more nutritious food sources within critical habitat areas improves the overall deer herd condition.

**8. Maintain or enhance sensitive plant habitat --** There are numerous populations of sensitive plants scattered throughout the project area. Fire plays a significant role in creating habitat niches that encourage the establishment and expansion of the sensitive plant species native to the Whale Rock area. It is anticipated that there may be conflicts between other resource needs and the desire to protect individual occurrences of sensitive plants. However, overall improvement to habitat for sensitive plants may be attained by appropriate land management, including the use of prescribed fire.

**9. Maintain economic practicality --** This issue addresses whether the harvest of relatively small quantities and values on a per-acre basis would be commercially practical. Actions proposed for the Whale Rock area must be economically sound in order to ensure successful accomplishment. Commodity values must be greater than the costs incurred for their removal. Activities necessary to achieve the objectives of the Whale Rock project will only be realistically accomplished by the sale of forest products, such as sawlogs. There are currently no reasonable alternative sources for funds to accomplish the needed work. Sawlog prices are moderately high; however, under current market conditions the cost of removing biomass-sized material is greater



than its market value. If economics are recognized in the design of the alternatives, it should be possible to propose a project that is economically feasible to implement.

**10. Maintain air quality --** Air quality can be adversely affected by smoke from prescribed fires and wildfires or by dust from harvest related activities. Dust abatement made necessary by road use is hampered in this area by the lack of readily available, permanent water sources. This problem becomes particularly acute in the western portions of the project area in late summer. Activities designed to reduce the likelihood of catastrophic fire and the attendant air quality degradation are also likely to produce some short term air quality reduction.

**11. Maintain or enhance the unique features of the lava caps --** Lava caps (used here to signify open rocky areas that are part of an ancient mudflow initiated by volcanic activity) and their associated flora and fauna contribute important elements to the overall biodiversity found within the Whale Rock project area. A concern exists that unplanned or unintentional disturbance or damage to these unique areas may occur if ground-disturbing projects are initiated. It is also recognized that there are opportunities to perpetuate the unique characteristics of the lava cap by reducing encroaching brush and trees.

**12. Avoid impacts to significant cultural (heritage) resources --** There are a great number of historic and prehistoric cultural resources within the project area. The issue is whether a large scale project could adversely affect significant cultural resources. Protection will be afforded to significant sites through project design.

**13. Maintain the scenic quality along the Highway 50 corridor and the South Fork of the American River --** A program of large scale vegetative manipulation has the potential to create unnatural looking vistas that would not meet visual quality objectives for viewsheds along Highway 50 and the river. A two mile section of the South Fork of the American River within the Whale Rock project area is eligible for inclusion in the Wild and Scenic Rivers System for its outstandingly remarkable recreation and historical values. A concern exists that activities within the project area would affect viewsheds and not be compatible with the possible designation of the river.

### **THE ALTERNATIVES CONSIDERED IN DETAIL**

Alternatives were developed to respond to the principal issues raised in the discussions surrounding the purpose and need for action, and issues raised during the scoping process. Each alternative addresses the purpose and need for action to varying degrees. Each alternative differs with respect to the type, degree and intensity of proposed management prescriptions and may require diverse management activities for a number of years to meet the desired future condition for the analysis area. Alternatives will follow guidelines, including Adaptive Management Strategies, outlined in the California Spotted Owl Sierran Province Interim Guidelines Environmental Assessment Report (CASPO). A new Region 5 Draft EIS (January 1995) proposes longer term strategies for maintaining spotted owl viability than those recommended under the CASPO Interim Guidelines (USDA Forest Service 1995). The preferred alternative proposes that the landscape be managed to provide for sustainable wildlife habitat through the restoration of forest health and the protection of riparian zones. Under this alternative, ridgetops would be managed as fuelbreaks, with decreased levels of snags and logs as compared to the rest of the project area, and a canopy closure of less than 40%. Riparian zones would be managed to retain late seral forest characteristics. Mid-slopes would be managed to provide

foraging habitat for late successional species while still taking action to reduce the risk of catastrophic fire. The activities proposed in the preferred alternative in the new spotted owl EIS are very similar to those proposed here in Whale Rock, as described below.

<b>Table S-1. List Of Alternatives Considered In Detail For the Whale Rock Project Area</b>	
<b>Alternative</b>	<b>Description</b>
A	No Action
B	Fuels Management Emphasis
C	Wildlife Management Emphasis with Adaptive Management Strategies
D	Timber Management Emphasis
E	Multi-Resource Management Emphasis

Alternative A, No Action, would allow no activities to reduce fire hazards or enhance wildlife habitats. Alternative B emphasizes reducing fire hazards through fuels manipulations (prescribed burning, commercial thinning, biomass removal) and the construction of shaded fuelbreaks. Alternative C provides for sustainable wildlife habitat through fuels reduction, commercial thinning and biomass removal, while also allowing for thinning and burning within Protected Activity Centers (PACs). Alternative D addresses the issue of harvesting timber (commercial thinning and biomass removal in plantations and natural stands) to aid in fuels reduction and to meet current and future timber demands. Alternative E integrates elements of Alternatives B through D to meet wildlife, fire and timber objectives.

Key differences between management strategies for Alternatives A through E are provided in Table S-2. Table S-3 highlights the characteristics distinguishing Alternatives A through E. The actions proposed in each alternative are described in more detail below.

#### **Alternative A: No Action**

This is the "No Action" alternative required for consideration under the National Environmental Policy Act (NEPA). The main objective of this alternative would be the perpetuation of existing conditions across the area. The emphasis of this alternative is that no action would occur within the analysis area. This alternative responds to issues 2, 6, 8, 10, 12 and 13 by preventing direct disturbance from project activities to any of the area resources. Implementation of this alternative would entail no actions to reduce fire or safety hazards or to improve the health of the watersheds, wildlife habitat, or forest ecosystem in general.



Table S-2. Summary of Key Differences Between Alternative Management Strategies

Management Activity	Alternative Management Strategies Under CASPO				
	Interim Guidelines				
	A No Action	B Fuels	C Wildlife w/ Adapt. Mgt.	D Timber	E Multi. Res.
<b>Harvest Related</b>					
Plantations Thinned (Acres/Volume in MBF)	0	562/1124	562/1124	562/1124	562/1124
Total Fuelbreaks Planned (Miles)	0	14.5	0	0	14.5
Constructed Fuelbreaks Harvested -Natural Stands (Acres/Volume in MBF) <sup>1</sup>	0	914/6135	0	0	914/6135
Other Natural Stands Harvested (Acres/Volume in MBF)	0	3181/15,167	1986/11,840	962/5291	2203/12,233
Total Natural Stands Harvested (Acres/Volume)	0	4095/21,302	1986/11,840	962/6291	3117/18,368
Total Acres Harvested	0	4657	2548	1524	3679
Total Sawtimber Removal (MBF)	0	22,426	12,964	6415	19,492
Total Biomass Removal (Tons)	0	67,169	31,895	17,240	49,565
New Road Construction (Miles)	0	1.7	1.0	1.6	2.2
Road Reconstruction (Miles)	0	29.3	19.2	14.9	32.1
PACs Harvested (#) (Acres Included Above)	0	0	3(141)	0	0
<b>Post Harvest Related</b>					
Total Harvest Acres Machine Piled <sup>2</sup>	0	1024	462	240	777
Total Harvest Acres Prescribed Burned <sup>3</sup>	0	3633	2086	1284	2902
Total non-Harvest Acres Prescribed Burned <sup>4</sup>	0	1646	3075	241	831
Total Acres Burned <sup>5</sup>	0	6303	5623	1765	4510
Lava Caps Prescribed Burned <sup>6</sup>	0	241	241	241	241
PACs Prescribed Burned <sup>7</sup>	0	590	493	0	590
Stumpage \$ Generated <sup>8</sup>	0	5,235,750	3,055,500	1,459,325	4,624,500

<sup>1</sup> All harvested areas in fuelbreaks are within natural stands. <sup>2</sup> Machine piles will be burned. <sup>3</sup> Total harvest acres prescribed burned; prescription will call for understory burning. <sup>4</sup> Total non-harvest areas prescribed burned; prescription calls for understory burning. <sup>5</sup> Total acres burnt; includes harvest acres, non-harvest acres, and machine-piled acres. <sup>6</sup> Acreage of lava caps prescribed burned included in non-harvest acres prescribed burned. <sup>7</sup> Acreage of PACs prescribed burned included in harvest acres prescribed burned and/or non-harvest acres prescribed burned. <sup>8</sup> Stumpage reflects harvested timber values only, not cost of implementing alternative. Values reflect stumpage rates of \$250/MBF and biomass cost of \$200/ac.



<b>Table S-3. Distinguishing Characteristics of the Alternatives</b>					
Action	Alternative				
	A	B	C	D	E
Harvest in PACs	no	no	yes	no	no
Burn in PACs	no	yes	yes	no	yes
Fuelbreaks	no	yes	no	no	yes
Snag & Down Logs <sup>1</sup>	Existing	LRMP	LRMP	LRMP	LRMP
Adaptive Management	no	no	yes	no	no
Designed to Address Issues Number	2,6,8, 10,12, 13	1,3,4, 9,11	11,4,6, 7	4,5,9	1,3,4, 5,6,7, 9

<sup>1</sup>LRMP = LRMP levels with CASPO amendment

### ***Alternative B: Fuels Management Emphasis***

This alternative proposes to construct shaded fuelbreaks on major ridges and to treat large, contiguous areas to reduce the risk from catastrophic wildfire. The emphasis of this alternative is to reduce the risk of catastrophic fire for the long term through fuel manipulation. The treated areas are designed to be sufficiently large as to make a difference in terms of predicted fire behavior. Areas selected for fuels treatment are those most susceptible to catastrophic fire and most conducive to the use of prescribed fire. This alternative was designed primarily to address Issues 1, 3, 4, 9, and 11 to varying degrees.

A total of 6,303 acres would be subject to fuels treatment, with prescribed burning occurring on 3,633 acres after harvest activities. Another 1,646 non-harvested acres would be broadcast burned, including 590 acres within spotted owl Protected Activity Centers (PACs). Machine piling of 1,024 acres would also occur. Approximately 14.5 miles of constructed shaded fuelbreaks are included in this alternative. Harvest activities would include the commercial thinning of 1,124 MBF on 562 acres of plantations and 15,167 MBF on 3,181 acres of natural stands. Total quantities of sawtimber and biomass to be removed are estimated at 22,426 MBF and 67,169 tons, respectively.

### ***Alternative C: Wildlife Management Emphasis With Adaptive Management***

The emphasis for this alternative is to provide sustainable wildlife habitat in the Whale Rock area. Habitat will be protected and enhanced through project activities, including thinning and biomass removal in plantations and natural stands. In the long term, this objective would be met by mimicking historic habitat patterns and successional processes which were present prior to the practice of fire suppression and exclusion. Many of the Protected Activity Centers (PACs) located within the project boundary contain dense thickets of small diameter trees. These areas are providing little or no value to spotted owls while greatly increasing the risk of stand-replacing

fires. Under this alternative, these stands would be thinned and prescribed burned to reduce the fire risk and to increase growth rates for the remaining trees. This alternative was designed primarily to address Issues 1, 4, 6, and 7, to varying degrees.

The long term goals will involve managing the area for a more open ponderosa pine habitat, so that 40 to 50% of the area would eventually be dominated by large ponderosa pine with approximately 40% canopy closure. Interspersed throughout the area (5-10%) would be pure stands of oak and open brushfields. These areas would be managed to ensure regeneration of new vegetation. Harvest would occur by thinning 1,124 MBF from 562 acres of plantations, and 11,840 MBF from 1,986 acres of natural stands, including thinning of 141 acres of natural stands inside of spotted owl PACs. Total sawtimber and biomass removed would be 12,964 MBF and 31,895 tons, respectively. Within PACs, 352 acres would be prescribed burned. Fuels treatments would occur on a total of 5,623 acres (2,086 harvested acres; 3,075 non-harvested acres). Machine-piling would occur on 462 acres. There would be no shaded fuelbreaks in this alternative.

#### ***Alternative D: Timber Management Emphasis***

The emphasis of this alternative is the intensive management of capable, available and suitable lands for timber production. Continued reliance upon wildfire exclusion would be the long term management strategy, although some improvement in catastrophic fire resilience would be expected in those stands selected for entry for sawtimber or biomass removal. This alternative proposes thinning of all existing older plantations and specific natural stands. The natural stands and plantations selected for entry are those that are capable of supporting commercial sawtimber or biomass operations. Stands identified for entry would be primarily selected on the basis of opportunities to maintain or improve the health, sustainability and long term yield of wood products in accordance with the approved Forest standards and guidelines for the pertinent management areas. This alternative was primarily designed to address Issues 4, 5 and 9, to varying degrees.

Project activities would include commercial thinning of 562 acres of existing plantations (1,124 MBF) and 962 acres of overstocked, pole-sized natural stands (5,291 MBF). Biomass would be removed on all acres harvested. Total quantities of sawtimber and biomass to be removed are estimated at 6,415 MBF and 17,240 tons, respectively. Prescribed burning on 1,284 harvested and 241 non-harvest acres is a proposed post-sale activity. Machine piling will occur on 240 acres, with the piles subsequently burned. There are no fuelbreaks in this alternative.

#### ***Alternative E: Multi-Resource Management Emphasis***

This alternative was developed by modifying and integrating several management actions proposed in Alternatives B through D. The emphasis of this alternative is to meet wildlife, fire and timber objectives by enhancing wildlife habitat and reducing the risk of catastrophic fire. This alternative proposes to construct fuelbreaks, thin natural stands and plantations, and implement an extensive prescribed burn program. This alternative was designed to address Issues 1, 3, 4, 5, 6, 7 and 9 to varying degrees.

The selection of harvest units under this alternative is a reflection of the effort to balance the desirability of treatment with economic and practical feasibility. Harvest units are prioritized and selected on the basis of economics, stand conditions and locations, combined with wildlife and

fuels objectives. Management activities tend to be concentrated where mutual objectives of wildlife, fuels and timber management coincide.

Proposed activities include constructing shaded fuelbreaks, thinning in plantations and natural stands, and implementing an extensive prescribed burn program to enhance wildlife habitat and reduce the risk of catastrophic fire. This alternative proposes thinning of 1,124 MBF from 562 acres of existing plantations and 12,233 MBF from 2,203 acres of natural stands. Total quantities of sawtimber and biomass to be removed are estimated at 19,492 MBF and 49,565 tons, respectively. Fuels treatment will occur on a total of 4,510 acres, 590 of which will be in non-harvested portions of PACs. Machine piling, with subsequent burning of piles, will occur on 777 acres. Approximately 14.5 miles of shaded fuelbreaks will be constructed.

### **THE PREFERRED ALTERNATIVE**

Alternative E, the Multi-Resource Management Emphasis, is identified as the Preferred Alternative in accordance with section 1502.14(e) of the National Environmental Policy Act Regulations. This alternative provides for the best blend of management actions to economically meet the desired condition for the Whale Rock area while addressing all the issues. Alternative E also represents the best balance between fuels reduction, current Regional Forest Management direction, the protection of wildlife habitat and the enhancement of biodiversity.

### **ENVIRONMENTAL CONSEQUENCES**

This section outlines the key environmental consequences to the Whale Rock area of implementing each alternative.

#### ***Alternative A: No Action***

No Action will avoid direct effects to the watersheds. There would be no increase in the equivalent roaded acres (ERAs) within the watersheds of Whale Rock; therefore, the modeled cumulative watershed effects (CWEs) would continue to decrease. Conversely, there would be little or no permanent watershed improvement work, such as road rocking, obliteration of temporary roads or subsoiling of existing landings and skidroads. The indirect effects of No Action would be reflected in increased fire risk within the project area.

This alternative would preclude actions that are designed to reduce vegetation density within the project area. Late seral forest conditions would continue to develop, but not as quickly as they would if there were fewer small trees. High stand density would assure that there would continue to be high levels of tree mortality caused by insects and disease. Continued high mortality would add woody debris to existing high fuel loads. The resultant high fuel loads and high fire risk would maintain an unhealthy, untenable and unstable ecosystem condition. A major, stand-replacing wildland fire would therefore remain a high risk. If no management action were to take place, particularly fuels reduction, the likelihood of a large stand-replacing wildfire occurring would be high. Therefore, the effects of a wildfire are discussed as a possible indirect effect of the No Action Alternative.



Economic effects of no action are substantial. There would be no short-term return to the counties or to the general public from the sale of forest products. Community stability benefits, such as reliable employment and economic activity, from the sustained, even flow of forest products into local communities would not be realized. The economic costs of perpetual fire suppression and ultimately the economic losses associated with foregone timber growth opportunities are extremely high under this alternative. Costs of suppressing a fire that consumed the entire project area are estimated at \$18,000,000. Lost future timber values would add another \$180,000,000 to this cost.

The fact that no direct impacts to the various watersheds would occur under this proposal seems attractive. In actuality, severe impacts to these watersheds are predicted because of the inevitability of catastrophic wildfire. Catastrophic fire potential would continue to present the greatest risk to watershed health. Every resource would suffer damage should a catastrophic wildfire occur. Reducing the risk of wildfire is a prerequisite to returning the Whale Rock area to its historic condition wherein fire enhanced and sculpted the landscape. This alternative is very unlikely to provide ecosystem sustainability. It is quite unrealistic to expect that the desired future condition would be attained under the scenario presented. In addition, replacement volume for the Cox Canyon Timber Sale would not be secured.

#### ***Alternative B: Fuels Management Emphasis***

Alternative B proposes a high timber harvest level because of the need to provide maximum preparatory treatment prior to burning. This alternative poses some potential short term soils displacement and compaction problems because of the extensive acreage being treated, but the mitigation efforts of landing, skid road and temporary road obliteration reduce the concern to less than that posed by a predicted catastrophic fire. Air quality would be adversely affected by the impact of an intensive prescribed burning program. Watershed cumulative effects are second highest under this alternative. Four of seven watersheds would be over the threshold of concern (TOC) for a period of 5 to 10 years. The acreage being treated also poses risk to sensitive plants and cultural resources; however, these risks can be effectively mitigated through contract clauses and flag-and-avoid procedures.

Many of the high priority areas for wildlife habitat improvement work are treated, but not all. Nearly 600 acres of PACs are prescribed burned, thereby providing substantial protection to these key wildlife areas. The benefits to wildlife are expected to outweigh the level of disturbance. There would be a more rapid development of late seral forest conditions because of the removal of small, shade tolerant trees currently growing in over-dense situations.

This alternative would cost approximately \$3,400,000 to implement, but more than \$5,200,000 would be directly returned to the public through timber receipts. Approximately \$1,300,000 would be returned to local counties for roads and schools. A total of 292 full-time, year-round jobs would be supported in Alternative B, and more than \$5,700,000 in total economic activity and over \$4,900,000 in personal income would be generated. By reducing the incidence of wildfire, it is expected that over \$10,000,000 would be saved from reduced future fire fighting and in excess of \$106,000,000 in future timber losses could be avoided. There is a 10,600 acre reduction in predicted wildfire size compared to Alternative A. Since fuels treatment effectively reduces the size of a potential catastrophic fire to about 7,400 acres, it is more likely that all stands within the project area can be perpetuated without loss to wildfire. Alternative B offers the opportunity to move a third of the total project area toward its historic condition, thus the desired condition for the Whale Rock area would be met in large measure by implementing this alternative.

***Alternative C: Wildlife Management Emphasis With Adaptive Management***

Since the areas selected for treatment under this alternative emphasize wildlife habitat improvement, the benefits for wildlife are somewhat greater than in Alternative B. Many of the PACs contain dense thickets of small diameter trees. These areas provide little to no value to spotted owls or other species while greatly increasing the risk of stand-replacing fires. These stands would be thinned and prescribed burned to reduce the fire risk and to increase the growth rate of the remaining trees.

Alternative C proposes to prescribe burn nearly as many acres as Alternative B, but harvest would be confined to about 2,548 acres (which is slightly more than half the acres harvested in Alternative B). However, the likelihood of being able to successfully burn 3,075 acres without a pre-burn harvest is a concern under this alternative, as numerous smaller burns would be needed over a longer period of time to reduce the fuels to the same level as would occur with a pre-harvest entry. Watershed effects are reduced by decreased harvest, although two watersheds would still exceed their TOC. The recovery time for all watersheds would be shorter under this alternative than Alternative B.

This alternative would remove 12,964 MBF of timber, with a value of \$3,055,000. Of this amount, approximately \$764,000 would be returned to the counties. A total of 166 full-time, year-round jobs would be supported under Alternative C, and more than \$3,200,000 in total economic activity and \$2,800,000 in personal income would be generated. It would cost an estimated \$2,500,000 to implement this alternative. The number of acres potentially subject to catastrophic fire is estimated at 7,900 acres under this alternative. Suppression cost savings on the 10,000 acres no longer susceptible to catastrophic burning due to project activities would be about \$10,068,000, and savings due to a decrease in foregone timber growth would be about \$100,680,000.

Although nearly 700 fewer acres would be prescribed burned under Alternative C than Alternative B, the fact that most of the prescribed burning under this alternative occurs without a biomass harvest actually increases the adverse effects upon air quality on a per-acre-burned basis. The net effect is about the same on air quality as Alternative B. Although there would be some effects to soils, they are less in this alternative than in Alternative B. Potential risks to cultural resources and sensitive plants are similarly reduced.

This alternative would aid in achieving the desired condition in the Whale Rock project area, similarly to Alternative B, but with slightly reduced resource impacts. However, the probability of successfully burning the acreage goals in this alternative is greatly reduced, by the increased number of burn cycles needed to reduce the fuel loading to the desired level. This situation is brought about by the absence of a pre-burn harvest on many of the acres.

***Alternative D: Timber Management Emphasis***

Since this alternative proposes the least harvest and prescribed burning of all action alternatives, the effects upon all resources are considerably less than in the other action alternatives. Actual acres of soil disturbance by equipment would be about one third of that estimated for Alternative B. Cumulative watershed effects are also greatly reduced because of the reduced harvest. Only



two watersheds exceed their TOC, primarily as a result of existing disturbance levels. Since no large blocks of land are harvested, the acreage proposed for prescribed burning is reduced. Only the units that are harvested, and selected lava caps with existing low fuel loading, are to be burned. The low level of prescribed burning means that impacts to air quality from the prescribed burning program are minimized.

The harvest of 6,291 MBF would generate \$1,459,325 in timber receipts, of which \$364,000 would go to the local counties. An estimated 83 year-round jobs would be created or maintained, and more than \$1,600,000 in total economic activity and \$1,400,000 in personal income would be generated by this alternative. Alternative D would cost an estimated \$1,300,000 to implement.

The scattered nature of the harvest and burn units makes this alternative only marginally effective in reducing the potential for catastrophic wildfire. Still, approximately 4,900 acres would be less likely to burn as a result of treatment under this alternative. The suppression cost savings on this 4,900 acres would be \$4,900,000, and the savings in reduced foregone timber would be \$49,000,000.

Alternative D provides some benefits to the Whale Rock area in terms of reduced risk of catastrophic fire with very little risk of adverse impacts brought about from actions within the alternative. This alternative generates sufficient funds to carry out a program of prescribed burning. However, the fact that the harvest units tend to be scattered reduces the efficiency with which the units can be burned and decreases the efficacy of the burning in terms of achieving the desired condition on a landscape-wide scale.

#### ***Alternative E: Multi-Resource Management Emphasis***

This alternative proposes to harvest and prescribe burn acreage levels that are intermediate in size compared to other alternatives. The environmental and economic risks and effects of Alternative E are correspondingly intermediate when compared to the other action alternatives.

From a geology and soils perspective, the reduced risk of catastrophic fire presents far greater benefit to these resources than the potential adverse effects that the proposed program of harvest and prescribed burning might bring. The cumulative watershed effects are less in this alternative than in Alternative B because less acreage would be treated. Still, three watersheds would exceed their TOC for approximately 3 to 5 years.

The socioeconomic effects associated with the proposed harvest of 19,492 MBF of timber are quite substantial. Alternative E would cost about \$2,900,000 to implement and it would generate over \$4,600,000 in receipts, with about \$1,200,000 being returned to the affected counties. An estimated 250 year-round jobs would be created or maintained, and \$4,900,000 in total economic activity and \$4,200,000 in personal income would be generated by this alternative. The reduction in potential catastrophic burn acreage results in a likely reduction in future suppression costs of \$8,700,000, and the avoidance of \$87,000,000 in foregone timber losses. A common element in all the resource discussions is the recognition that the greatest risk is presented by catastrophic fire. Alternative E reduces potential catastrophic fire acreage by half, with corresponding benefits.



Alternative E offers the opportunity to begin to restore nearly one-quarter of the total project area to its historic condition. The desired condition within the Whale Rock area would be met in large measure by implementing this alternative.

#### **ORGANIZATION OF THIS DEIS**

This DRAFT EIS (DEIS) is organized to comply with the Council on Environmental Quality (CEQ) regulations (40 CFR 1502.10) and the Forest Service guidelines for implementing NEPA and the CEQ regulations. Chapter I describes the purpose and need for action. Chapter II describes the range of alternatives developed in response to issues raised during the agency and public scoping process, and the process by which some alternatives were eliminated from detailed study. Chapter III describes the environment that may be affected by a decision. Chapter IV describes, evaluates and compares the potential impacts of the alternatives considered in detail on the physical and socioeconomic environment. Chapter V contains a list of the preparers of this DEIS, and Chapter VI contains the distribution list for the DEIS. A list of references cited, a glossary, an index, and appendices with supportive information follow.

*Please use this page for notes.*

# **CHAPTER I**

## **PURPOSE AND NEED FOR ACTION**

### **PROPOSED ACTION**

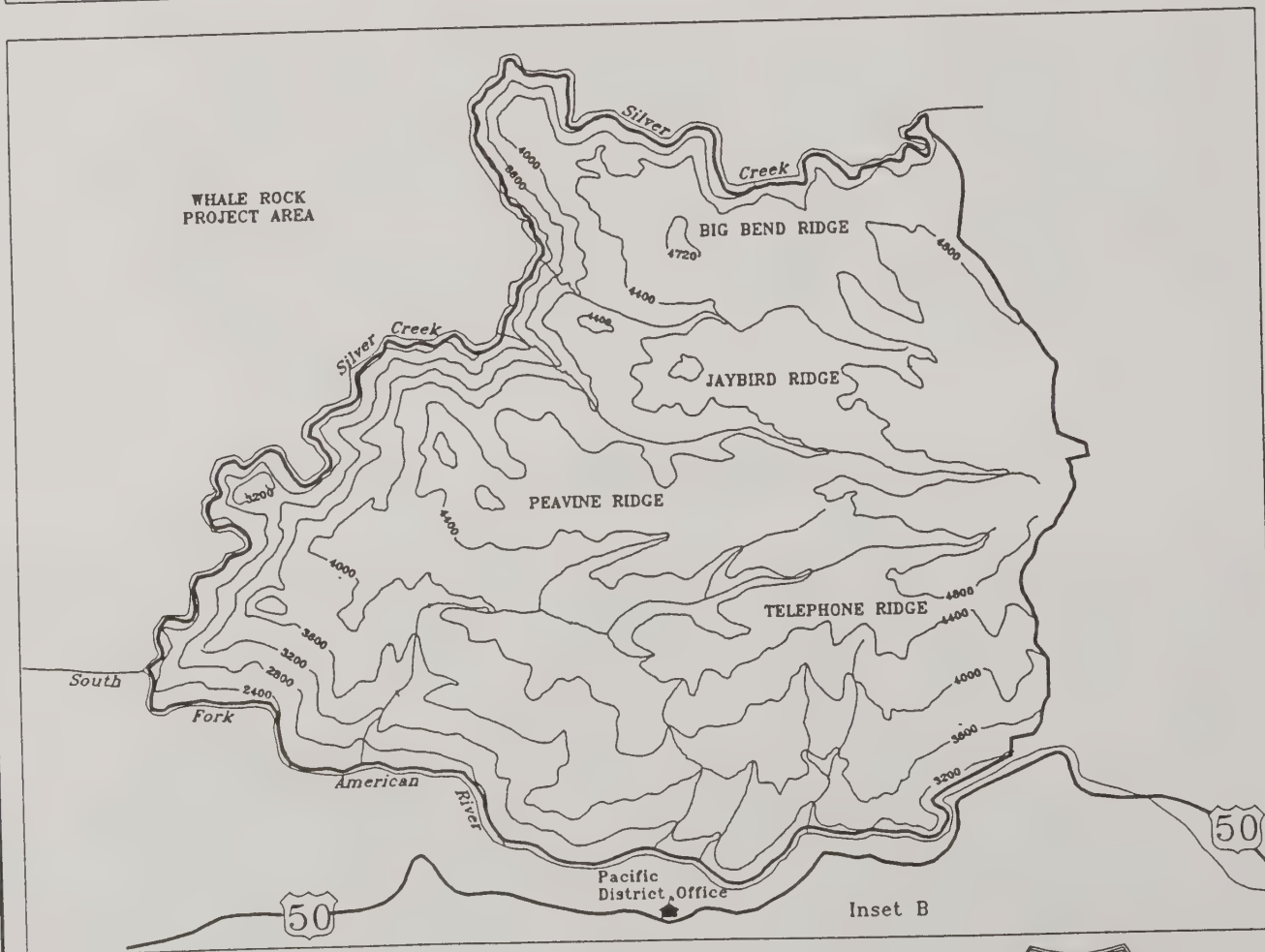
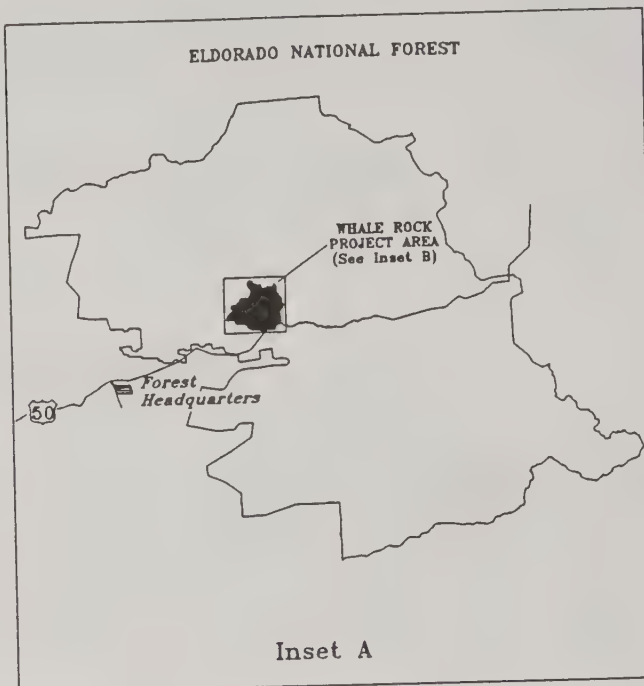
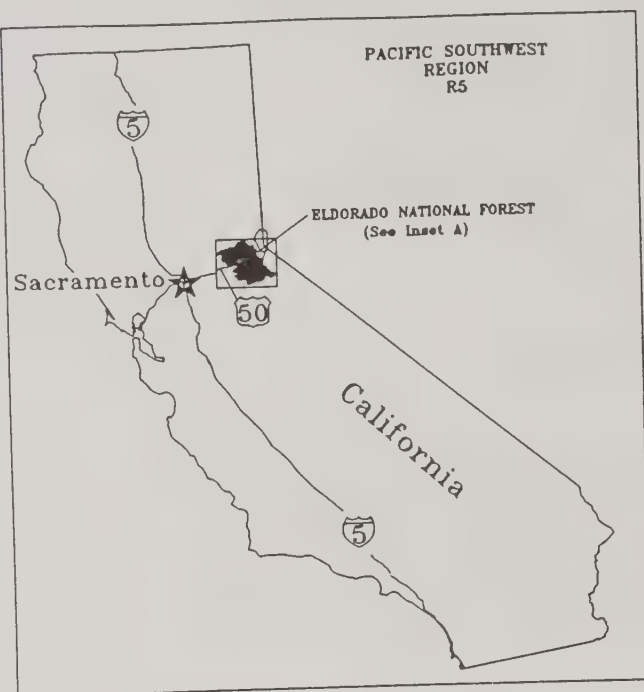
The Forest Service proposes remedial, restorative and preventative treatment and management actions in order to improve forest health and re-establish a sustainable landscape condition on public lands within the Whale Rock area on the Eldorado National Forest (Figure 1). More specifically, the Pacific Ranger District proposes to implement activities to reduce fuel loads and fire hazards, and to improve wildlife habitat and timber growth, while considering effects on other resources and activities.

The action proposed on the Whale Rock Project includes the commercial thinning of 19,492 MBF of sawtimber from a total of 3,679 acres. In addition, 49,565 tons of biomass will be removed. Fourteen and one-half miles of shaded fuelbreaks will be constructed, centered primarily atop Big Bend, Jaybird, Telephone and Peavine Ridges. A total of 2.2 miles of new road will be constructed to access activity areas. Post-harvest prescribed burning will be conducted on 4,510 acres and post-sale fuels treatment by tractor piling will occur on 777 acres. Harvest activities will begin in 1996 and post-harvest fuels treatment will extend for seven years after harvest is initiated. These activities are described in detail in Chapter II, Alternative E.

### **PURPOSE AND NEED**

The Whale Rock Forest Health Multi-Resource Project Draft Environmental Impact Statement (EIS) considers actions intended to improve and restore the forest health of the analysis area. Forest Health, as a concept, may be described on a biological, ecological, historical, ethical or aesthetic basis (Costanza et al. 1992). Forest Health may also be defined as "a condition of forest ecosystems that sustains their complexity while providing for human needs" (Sampson et al. 1994:11) or "the ability of a system to maintain its structure and patterns of behavior in the face of disturbance" (Holling cited in Costanza 1992:246). For purposes of this project, all three definitions will be used in assessing both the current and desired health of the Whale Rock project area. It should be noted that the above definitions require subjective value judgements as to what constitutes health. It is recognized that it is often easier to identify an "unhealthy" forest situation than it is to define what exactly a "healthy" forest is (Sampson et al. 1994:11).





PACIFIC SOUTHWEST REGION  
ELDORADO NATIONAL FOREST  
PACIFIC RANGER DISTRICT



Figure 1. Location of Whale Rock Forest Health Multi-Resource Project on the Eldorado National Forest in California.

The current conditions on the Whale Rock project are similar to conditions present on other forested landscapes throughout the Sierra Nevada (cf. Smith et al. 1994), as well as much of the inland west. This condition has been recently described for the forests of the inland west by R. Neil Sampson with others (1994), and their description aptly applies to the Whale Rock project area:

The forests at greatest risk are composed of an unsustainable combination of tree species, densities, and age structures that are susceptible to the fire and drought regimes common to the region. ...The forest areas under the most stress contain too many trees, or too many of the wrong kind of trees, to continue to thrive. As the trees get older and larger, the competition intensifies, stress increases, and the likelihood of catastrophic changes goes up accordingly.

This is a particular problem in forests where the species mix has shifted away from ponderosa and other long-needled pines and toward firs. This species shift, attributable to a combination of logging, grazing, fire exclusion and related activities over the past century, has been well documented.

Under these altered conditions, competition for moisture and nutrients creates stress, which exacts a significant toll in reduced growth, while opening the way for catastrophic outbreaks of insects, disease, and wildfire. Wildfires in these ecosystems have gone from a high-frequency, low-intensity regime which sustained the system, to numerous high intensity fires that require costly suppression attempts, which often prove futile in the face of overpowering fire intensity. High fuel loads resulting from the long-time absence of fire and the abundance of dead and dying trees, result in fire intensities that cause enormous damage to soils, watersheds, fisheries, and other ecosystem components.

Though it is readily recognized that scientific knowledge is incomplete, modern ecosystem theory provides a basis for corrective actions that can mitigate current levels of risk and potential damage, and facilitate improved forest health. Through corrective actions and ecosystems management, we can balance forest structures across landscapes, increasing the opportunity for maintaining biological diversity and reducing the impact and scale of inevitable disturbances (Sampson et al. 1994).

California forested areas are experiencing catastrophic losses due to drought and bark beetles (Smith et al. 1994:1). Tree mortality in excess of 80% of standing volume has been greatest in overstocked stands where past harvesting practices and successful fire control and suppression strategies have encouraged the growth of tree species susceptible to insects, pathogens, fire and drought.

Fire is a significant component of ecosystem functioning in California forests and is recognized as an integral and important part of many vegetation communities in the Sierras. A total of 5.6 to 13.2 million acres per year burned in California prior to

Euroamerican presence from a combination of natural ignitions and fires deliberately set by Native Americans. This is over ten times the area burned annually in California in the last 50 years (Smith et al. 1994:1).

The Whale Rock analysis area and the other areas on the Pacific Ranger District exhibit many of the same characteristics described above in terms of species composition and density. Landscapes historically were characterized as follows:

The inviting openness of the Sierra woods is one of their most distinguishing characteristics. The trees of all species stand more or less apart in groves, or in small irregular groups, enabling one to find a way nearly everywhere, along sunny colonnades and through openings that have a smooth, park-like surface, strewn with brown needles and burs.

...One would experience but little difficulty in riding on horseback through the successive belts all the way up to the storm-beaten fringes of the icy peaks (Muir 1894:111).

These areas are now more often composed of dense understory thickets of white fir and incense cedar that are nearly impenetrable to a person on foot. The current vegetative conditions differ so markedly from the historic condition that it is possible to conclude that the current stands exceed the historical range of variability in terms of ecosystem structure and process. The structure of the current forested landscape represents an unstable, unsustainable and therefore undesirable departure from the historical range of variability for this area.

There are obvious indications that the Whale Rock analysis area is in an unhealthy condition. For example, unusually high levels of insect related tree mortality have been present within the Whale Rock area on two distinct occasions within the last two decades. Forest inventory data indicates that the Whale Rock project area 'normally' experiences approximately 500 MBF in mortality each year (50 BF/acre/year mortality); however, during 1976-77 hundreds of old growth ponderosa pine and sugar pine succumbed to the combined effects of drought and insect attack. The mortality in the Whale Rock area during this two year period was estimated at approximately 5,000 MBF. During the prolonged drought of 1987-1993, an estimated 20,000 MBF of timber was salvaged from within the project area. An additional 7,000 - 10,000 MBF may have died within the project area and was not salvaged. During the most recent period of high mortality, tree losses have been primarily confined to white fir.

An unhealthy forest condition is also exhibited with the presence of catastrophic fire. In September of 1992, the Cleveland wildfire burned approximately 15,000 acres within the Pacific Ranger District boundary. The western limit of this stand-replacing wildfire is the eastern boundary of the Whale Rock analysis area. The topography, fuel loadings and vegetation within the Cleveland fire area prior to the burn were essentially identical to the conditions that currently exist within the Whale Rock landscape. A fire similar to



the Cleveland Fire swept through the southern third of the Whale Rock area nearly three decades ago. The area remains at a high risk for catastrophic fire.

The abnormally high levels of tree mortality that have occurred within the Whale Rock project area and the recently experienced extreme fire behavior on adjacent lands that are identical to the Whale Rock area provide ample evidence that the analysis area is in a high risk condition. Areas such as the Whale Rock project are at a critical juncture; nature's response to the conditions within the Whale Rock project area have been clearly evidenced on the Pacific Ranger District and numerous similar locations throughout the west in the form of catastrophic levels of tree mortality caused by the combined effects of insects, drought and wildfire. The effects have been dramatic and severely detrimental to the diversity, distribution and viability of plant communities, wildlife and fisheries. Substantial damage to watersheds and valuable improvements, as well as enormous commodity losses, are additional problems associated with forests that are in an unhealthy state.

The vegetative conditions that presently exist within the Whale Rock analysis area have been primarily created by the preclusion of both natural fire regimes and past (pre-European) burning practices, and the inclusion of timber management practices. The interplay of these three factors has occurred over a period of many decades. The restoration of the Whale Rock analysis area to a more natural, healthier condition will require appropriate management that will extend into the 21st century. It is the purpose of the Whale Rock Multi-Resource Forest Health project to begin the process of restoring and maintaining the health, the resilience and the sustainability of the desired vegetation of the Whale Rock area and in so doing, thereby improve, maintain and perpetuate the other dependent resources, as directed in the Eldorado National Forest Land and Resources Management Plan (LRMP 4-1 to 5).

There is also a need to identify timber that can be used to replace the timber sold in 1992 in the Cox Canyon Timber Sale. As a result of concerns expressed by the public regarding the adequacy of the environmental analysis for the Cox Canyon Timber Sale, a review of the environmental documentation for the sale was initiated in December 1992. The review included analyses of cumulative effects on watersheds, California spotted owl, Pacific fisher, late-seral forests, as well as other resources. The results of the review indicated that the Cox Canyon Timber Sale, as currently planned and in combination with other sales, would not maintain future management options for the California spotted owl. In order to avoid this result, we are exploring an environmental modification of the existing contract for the Cox Canyon Timber Sale and seek replacement volume for the modified units. A summary of the findings from this review is located in Appendix I. Land delineated by the legal description of the Cox Canyon Timber Sale falls within the area analyzed in the Whale Rock Forest Health Project Environmental Impact Statement; therefore, volume within the sale area is covered within this EIS. It is anticipated that some portion of the timber products identified in this EIS would be applied to replacing volume from the Cox Canyon Timber Sale.

## **DESIRED CONDITION**

The desired condition for the Whale Rock project area is a forested landscape that has a lower risk from large-scale catastrophic fires while sustaining a viable, healthy ecosystem that supports endemic plant and animal populations. The desired condition for the majority of the Whale Rock area can best be described by paraphrasing the descriptions of western forests offered by early observers:

The forest structure is even-aged by small, irregular groups of trees and is patchy and broken; hence, the forest is fairly immune from extensive crown fires. The forest floor is open, parklike, unobstructed and inviting. Large individual trees are abundant, standing singly or in groups across the landscape. Small groups of uniformly sized young growth occur in openings. Ponderosa pine is the dominant tree species, although sugar pine, Douglas fir, white fir and incense cedar are also present. Scattered throughout the landscape are patches of oak hardwoods and brush. The ground cover is largely composed of herbaceous species, low-growing shrubs and grasses. The forest productivity appears sustainable and healthy. Dead or dying trees and large down logs are present, but not common. Wildlife species that are dependent upon the character of the forest are in abundance. The inviting openness of the forest is the most distinguishing feature (Biswell 1989).

There is an obvious discrepancy between the desired condition in the Whale Rock area and the existing conditions. Currently, the Whale Rock area contains large areas of dense thickets of coniferous understory and has experienced catastrophic tree losses due to drought and insect infestations. The area remains at high risk to large, stand-replacing wildfires. The desired condition for Whale Rock is a forested landscape which has a low probability of supporting large-scale, catastrophic fires, with significantly reduced possibilities for insect infestation, and with enhanced habitat for wildlife.

## **DECISION TO BE MADE**

The interdisciplinary team has considered five alternatives in detail, including a no action proposal, intended to begin the process of re-establishing a healthy, sustainable forested condition. The decision that needs now to be made is whether to implement the proposed action (Alternative E), or one of the other alternatives, in order to meet the defined objective of improving the forest health, as measured by the various managed resources within the project area.

## **CHAPTER II**

# **ALTERNATIVES INCLUDING THE PROPOSED ACTION**

## **INTRODUCTION**

This chapter describes the alternatives developed by the interdisciplinary team (IDT) in response to the purpose and need for action. Alternatives were developed to respond to the principal issues raised in the discussions surrounding the purpose and need for action (Chapter I) and issues raised during the scoping process (below). Each alternative addresses the purpose and need for action to varying degrees. Alternatives differ with respect to the type, degree and intensity of proposed management prescriptions and may require diverse management activities for a number of years to meet the desired future condition for the analysis area.

Following the alternative descriptions and their response to the identified issues, the preferred alternative is identified, and a discussion of alternatives which were considered, but eliminated from detailed study, is also included. Near the end of the chapter is a discussion of the management activities and key differences distinguishing each alternative. Chapter IV describes the environmental effects of implementing each alternative in greater detail than provided in this chapter.

## **SCOPING**

In September of 1992, the Cleveland fire began on a south-facing slope in the South Fork of the American River Canyon. Several years of drought, hazardous fuel accumulations in natural stands and in plantations established after the 1959 Icehouse wildfire, combined with extreme fire weather conditions, caused the Cleveland fire to spread rapidly. In 72 hours, the Cleveland fire consumed 22,470 acres of forest. Much of the area burned with very high intensities; flame lengths of 200 feet and fire spread rates of more than one square mile per hour were experienced at times during the first three days of the fire.

For many people, the destruction of 22,470 acres of forested landscape irrefutably demonstrated that forests in a similar condition are likely to have a similar fate unless urgent changes are made. Pacific Ranger District personnel identified the lands within the Whale Rock analysis area as having landscape-wide conditions that are nearly identical to those that existed within the Cleveland wildfire area. With this in mind, internal discussions on the hazardous conditions and the desired future condition of the 'west end'



of the District began in the summer of 1993. On March 2, 1994, a Notice of Intent to prepare this environmental impact statement appeared in the Federal Register. On March 10, 1994, a letter was sent to 128 persons or organizations extending an invitation to attend an open house on March 29 in the community of Pollock Pines. Forest users, government agencies, elected officials, persons living within the analysis area or known to be interested in the area, and the general public were solicited for comments. Eleven individuals attended the open house and another five people provided written comments during this initial scoping period.

On April 22, 1994, Pacific District Ranger Craig Harasek organized an IDT to gather issues from the public and from within the agency, to develop alternatives to respond to the issues, and to analyze the effects of the alternatives. The team began by analyzing issues brought forward from previous environmental analyses conducted in the area as well as new issues raised during the public scoping efforts. In addition, the IDT analyzed the following information which was considered relevant to the Whale Rock project area. The applicability of this information to the proposed action is discussed in the relevant resource sections of this document and is presented here only for purposes of clarity. The following is a summary, organized by resource, of the additional information considered:

**1. Landscape Analysis:** This document incorporates ecosystem management concepts as described in the Pacific Southwest Region and Pacific Southwest Station Strategy For Implementing Ecosystem Management and Research (USDA Forest Service 1992). Landscape effects of the project activities are described in the Biological Evaluations, Cumulative Watershed Effects Analysis, Management Indicator Species documents, and Air Quality Assessments included in this report. Analysis guides for evaluating project activities occurring over the landscape include, but are not limited to:

Landscape Analysis-Late Seral Forests (Draft). Fites, Bingham, Lipton and Durham (1994b).

Preliminary Ecological Old-Growth Definitions for Mixed Conifer (SAF Type 243) in California. Fites, Chappel, Corbin, Newman, Ratcliff and Thomas (1992).

Biological Evaluation of the Cumulative Effects of Eldorado National Forest Timber Sales Upon the California Spotted Owl. Lipton (1993).

Biological Evaluation of the Habitat Requirements for Fisher on the Eldorado National Forest in Relation to Twenty-Four Sold Sales. Lipton and Bombay (1994).

**2. Watershed Condition and Riparian Habitat:** Updated Cumulative Off-Site Watershed Effects Analyses (CWEs) have been prepared for all watersheds within the

project area. Additional bases for analyzing riparian and aquatic habitat and making management recommendations are included in:

Viability Assessments and Management Considerations for Species Associated with Late-successional and Old-growth Forests of the Pacific Northwest, The Report of the Scientific Analysis Team (USDA Forest Service 1993b; also known as the SAT report). Applicable sections of this report for species or habitats found on the Eldorado National Forest were covered in the sections on riparian habitat conservation areas (RHCAs).

Region 5 Draft Soil Quality Standards that supplements the Soil Management Handbook (FSH 2509.18). USDA Forest Service, Region 5.

Cumulative Watershed Effects Analysis Summary by Basin for the Eldorado National Forest by K. Ivarson, C. Mitchell, C. Christiansen and C. Mulder (1995).

**3. Air Quality:** Analysis of air quality and effects of the proposed timber sale on air quality were guided by procedures outlined in:

Describing Air Resource Impacts From Prescribed Burning Activities in NEPA Documents. USDA Forest Service (1993c).

**4. Sugar Pine Management:** Management considerations and analysis of effects on sugar pine were guided by the following report, which states that apparent rust-free sugar pine should be harvested or thinned only if essential to meet stand management objectives:

Regional Policy for Sugar Pine Management. USDA Forest Service, Region 5 (1990).

The Whale Rock IDT met throughout the spring, summer and fall of 1994 to analyze issues and develop alternatives that addressed the proposed action. Through a series of meetings, field visits, and literature research, five alternatives were developed and analyzed in detail by the IDT. This DRAFT EIS represents the results of these efforts.

## DISCUSSION OF ISSUES

The IDT documented all issues raised by the agency and the public throughout the environmental analysis. As new issues emerged or new information was field verified, the team worked together to make adjustments that responded to the new data. During the analysis, some issues were included in all of the alternatives and since these were included in the design of each, they were not considered major issues that drove the alternatives. Additionally, similar issues were combined during the analysis process. Readers not familiar with all the terms that follow are directed to the Glossary for definitions. Specific

mitigation measures which address the issues and the potential effects are outlined near the end of Chapter IV, following the discussion of environmental consequences of each alternative. A plan for monitoring the effectiveness of the mitigation measures is included in Appendix J.

## **ISSUES CONTRIBUTING TO A DIFFERENCE BETWEEN THE ALTERNATIVES**

The following issues contribute to a substantial difference between the alternatives.

**1. Reduce the risk of stand-replacing fires --** This issue relates to whether the areas selected for treatment will be sufficiently large as to alter fire behavior and effectively reduce the likelihood of a stand-replacing fire. Treatment of small, isolated areas to reduce stocking and ladder fuels tends to be ineffective in a large catastrophic fire situation. Running crownfires entering these small treated areas will remain in the crowns of trees, unless the treated area is large enough to cause fire behavior to change.

**2. Minimize cumulative effects to natural resources --** Reducing the risk to the Whale Rock area from catastrophic fire and/or insect epidemic requires actions that are designed to reduce the density of vegetation, reduce the presence of ladder fuels and reduce fuel loadings on a large scale. The amount of disturbance caused by these proposed activities may have the potential to cause undesirable cumulative effects, including impacts upon vegetation, riparian areas, soils, watersheds and wildlife. For example, two watersheds (Riverton and Soldier Creek) are at or above their estimated Threshold of Concern (TOC) for Cumulative Watershed Effects. Other watersheds may also exceed their TOC if activities described in Alternatives B-E are enacted. These activities might also have an effect on established beneficial uses. It is simultaneously recognized that the greatest potential impacts to all resources within the Whale Rock project area would occur if a stand replacement wildfire, similar to the Cleveland fire, burned across the landscape.

**3. Reduce the risk of fire from and to private residences --** The presence of numerous private residences within an area designated as a "high fire hazard" zone is a concern. These residences are significant elements in terms of fire management. Should a wildfire occur on National Forest lands within the vicinity of the residences, limited fire control resources would be placed in a role of protecting the private structures rather than fighting the wildfire. In addition, private residences may serve as a location for potential accidents leading to a wildfire that would rapidly move onto National Forest lands. By reducing the potential severity of a wildfire on National Forest lands, the issue regarding the presence of an urban interface is greatly reduced.

**4. Balance the wildlife need for snags with the public/forest worker risks from snags --** The need to find the proper balance between the human safety risk and the wildlife benefits of high numbers of snags is an issue. Seven years of drought have resulted in unusually high numbers of snags. Snags provide unique and valuable wildlife



habitat, yet because of their numbers and adjacency to roads, snags also present potential high risk situations to the forest visitor or forest worker. In addition, in both prescribed burn and wildfire situations, the presence of high numbers of snags creates substantial risk to individuals on the fire line. Falling snags have caused numerous severe injuries and deaths in the last several years in California, both to members of the public and wildland firefighting crews. Although snags in excess of LRMP standards will be removed in harvest units in all the action alternatives, the total number to be removed in each alternative varies due to differences in number of harvest acres. The same is true for roadside hazard trees, since each alternative varies in number of road miles treated.

**5. Maintain rural economic vitality --** The sale of timber from the Sierra Nevada National Forests has declined substantially during the last decade. On the Eldorado National Forest, the sale of timber has been substantially reduced since 1993 because of the decision to emphasize the reconsideration of previously sold timber sales. As a result of the lack of new sale offerings in 1994 and 1995, local and regional concerns have been raised about the apparent absence of a "sustained yield" of periodic output of timber supply from the Eldorado National Forest. Mill closures, localized direct and indirect timber related unemployment, and substantial decreases in national and county receipts because of the depressed sale program have been identified as substantial and inter-related issues. Since the Whale Rock project area is located within the General Forest Zone as defined in the Eldorado Land and Resources Management Plan, it is likely that opportunities exist to improve and protect the forest health of the project area while simultaneously producing timber products that will provide a portion of the continuous supply of timber for the use and necessities of the general public.

**6. Maintain or enhance late seral (old growth) habitat conditions --** By implementing appropriate stand prescriptions it is possible to protect or enhance those stand characteristics that are most valuable to late seral wildlife species, such as the goshawk, spotted owl and furbearers. By initiating stocking control, it is possible to increase the growth rates of selected residual trees, thereby attaining old growth sized trees more quickly. Disturbance by harvest operations, prevention of snag development, removal of snags and downed logs and reduction in overall stand density may negatively affect some wildlife species.

## **ISSUES RAISED WHICH DO *NOT* CONTRIBUTE SUBSTANTIALLY TO A DIFFERENCE BETWEEN ALTERNATIVES**

Since the following issues have been mitigated in all action alternatives, they do not contribute substantially to a difference between the alternatives. However, since each of these issues was brought forward as a possible significant concern during the scoping process, the IDT elected to track these issues through the alternatives so that the public and the Deciding Officer could assess how they were addressed and mitigated. Additional information regarding how the concerns addressed in these issues will be mitigated or alleviated is included under the heading "*Information that applies to Alternatives B through E.*"

**7. Maintain or enhance early seral habitat conditions --** Although the Whale Rock project area is currently at medium habitat capabilities for management indicator species for early seral habitat, there is a concern that the project area will trend towards low habitat capabilities if no actions are taken in the area. By implementing appropriate stand prescriptions it is possible to protect and/or enhance those stand habitat characteristics that are most valuable to early seral wildlife species, such as mountain quail and deer. Much of the Whale Rock project area functions as critical winter deer range. The creation of more open timber stands favors the germination and development of succulent grass, forb and brush species. The increased availability of more nutritious food sources within critical habitat areas improves the overall deer herd condition.

**8. Maintain or enhance sensitive plant habitat --** There are numerous populations of sensitive plants scattered throughout the project area. Fire plays a significant role in terms of creating habitat niches that encourage the establishment and expansion of the sensitive plant species that are native to the Whale Rock area. It is anticipated that there may be conflicts between other resource needs and the desire to protect individual occurrences of sensitive plants. However, overall improvement to the habitat of sensitive plants will be attained by appropriate land management, including the use of prescribed fire.

**9. Maintain economic practicality --** This issue addresses whether the harvest of relatively small quantities and values on a per acre basis would be commercially practical. Actions proposed for the Whale Rock area must be economically sound in order to ensure accomplishment. Commodity values must be greater than the costs incurred for their removal. Activities that are necessary to achieve the objectives of the Whale Rock project will only be realistically accomplished by the sale of forest products, such as sawlogs. There are currently no reasonable alternative sources for funds to accomplish the needed work. Sawlog prices are moderately high; however, under current market conditions the cost of removing biomass-size material is greater than its market value. Economics will be recognized in the design of the alternatives, in order to propose a project that is economically feasible to implement.

**10. Maintain air quality --** Air quality can be adversely affected by smoke from prescribed fires and wildfires or by dust from harvest related activities. Dust abatement made necessary by road use is hampered in this area by the lack of readily available, permanent water sources. This problem becomes particularly acute in the western portions of the project area in late summer. Despite these difficulties, dust abatement practices such as road watering will be used in all action alternatives. Activities designed to reduce the likelihood of catastrophic fires and the attendant air quality degradation are also likely to produce some short term air quality reduction. LRMP standards and guidelines will be used to develop the proper burning prescriptions. Smoke management will include visual monitoring, monitoring of atmospheric conditions, fuel and duff moisture content, ignition techniques, rapid mop-up, season of burn and wind shifts.

**11. Maintain or enhance the unique features of the lava caps --** Lava caps (used here to signify open rocky areas that are part of an ancient mudflow initiated by volcanic activity) and their associated flora and fauna contribute important elements to the overall



biodiversity found within the Whale Rock project area. There exists a concern that unplanned or unintentional disturbance or damage to these unique areas may occur if ground-disturbing projects are initiated. It is also recognized that there are opportunities to perpetuate the unique characteristics of these lava cap areas by reducing encroaching brush and trees through project activities such as thinning and prescribed burning. An opportunity exists to interpret the unique features of the lava caps to the public. Under Alternatives B through E, portions of the lava caps specifically identified by the District or Forest botanist will be protected from project related disturbance by boundary posting and contractual requirements.

**12. Avoid impacts to cultural (heritage) resources --** There are a great number of historic and prehistoric cultural resources within the project area. The issue is whether a large scale project could adversely affect significant cultural resources. There is also an opportunity to interpret the past land use of the area to the public. Cultural resources will be managed in the alternatives as described in the section *"Information that applies to Alternatives B through E"* on page II-12.

**13. Maintain the scenic quality along the Highway 50 corridor and the South Fork of the American River --** A concern exists that a program of large scale vegetative manipulation could create unnatural-looking vistas that would not meet the foreground retention and middleground partial retention visual quality objectives as viewed from Highway 50, or the foreground retention objectives as viewed from the river. The portion of the South Fork of the American River from its source to the old Blair Bridge site was determined in 1990 to be eligible for inclusion in the Wild and Scenic Rivers System for its outstandingly remarkable recreation and historical values; this includes roughly two river miles within the Whale Rock project area. The river segment from the Blair Bridge site to Slab Creek Reservoir does not possess any outstandingly remarkable resource values. A concern exists that activities within the project area would affect viewsheds and not be compatible with the possible designation of the river. Lands within the minimum 1/4 mile corridor of the portion of the South Fork of the American River deemed eligible for inclusion into the Wild and Scenic Rivers System will be managed to protect and preserve the outstandingly remarkable recreation and historical values present. Visual quality objectives will be maintained in all alternatives for both the river and the Highway 50 corridor.

## **DESCRIPTION OF THE ALTERNATIVES CONSIDERED IN DETAIL**

The alternatives considered in detail are defined in different ways to accomplish the purpose and need for action in the Whale Rock analysis area (see Table 1). The alternatives also respond in varying ways to the issues identified for the Whale Rock area. The following section first describes information that applies to all "action" alternatives, then outlines the management activities proposed in each alternative. The degree to which each alternative responds to the issues is outlined later in this chapter in the section



following the alternative descriptions. This information should provide a basis for choice among the alternatives by the decision maker and the public.

The action proposed on the Whale Rock Project includes the commercial thinning of 19,492 MBF of sawtimber from a total of 3,679 acres. In addition, 49,565 tons of biomass will be removed. Fourteen and one-half miles of shaded fuelbreaks will be constructed, centered primarily atop Big Bend, Jaybird, Telephone and Peavine Ridges. A total of 2.2 miles of new road will be constructed to access activity areas. Post-harvest prescribed burning will be conducted on 4,510 acres and post-sale fuels treatment by tractor piling will occur on 777 acres. Harvest activities will begin in 1996 and post-harvest fuels treatment will extend for seven years after harvest is initiated. These activities are described in detail in this chapter as Alternative E. This proposal best meets the purpose and need for action, and the desired condition for the Whale Rock Area.

Other alternatives considered in detail include no action, and varying levels of commercial harvesting of biomass and sawtimber by thinning in order to reduce stand density in plantations and natural stands. The harvesting of trees from proposed shaded fuelbreaks would occur on selected ridges in two alternatives. The size range of the actions considered is a reflection of the differences between alternatives. Total acreage considered for harvest in the alternatives varies from none in the No Action Alternative, to approximately 1,500 to 4,700 acres in the remaining alternatives. The total quantity of commodities to be harvested ranges from none to approximately 17,000 to 67,000 tons of biomass and 6 to 22 million board feet of sawtimber. Shaded fuelbreak construction varies from 0 to 14.5 miles on Big Bend, Telephone, Peavine and Jaybird Ridges. New road construction needed to access the project area in all but the No Action Alternative would be from 1.0 to 2.2 miles and the reconstruction of existing roads would range from 14.9 to 32.1 miles. Post-project prescribed burning would occur on approximately 1,700 to 6,300 acres in these alternatives, and additional post-sale fuels treatment by tractor piling would occur on 240 to 1,000 acres of harvested lands.

<b>Table 1. List Of Alternatives Considered In Detail</b>	
<b>Alternative</b>	<b>Description</b>
A	No Action
B	Fuels Management Emphasis
C	Wildlife Management Emphasis with Adaptive Management Strategies
D	Timber Management Emphasis
E	Multi-Resource Management Emphasis

It should be noted that fire and fuels, wildlife, and timber needs are addressed in *all* the action alternatives. The "titles" of the alternatives simply reflect the *primary* driving resource behind development of each alternative in addressing the identified issues.

## **INFORMATION THAT APPLIES TO ALTERNATIVES B THROUGH E**

The following information is applicable to Alternatives B-E. The information is presented in this section to avoid repetition while improving understanding of the alternatives. In some instances the information presented responds to identified issues; in other instances, the information presented provides specific details concerning actions or activities that are integral aspects of the Alternatives B-E.

### **Pertinent Laws, Regulations and Policies**

National Forest management is guided by various laws, regulations and policies that provide the framework for all levels of planning. Proposed management activities in each alternative comply with all applicable federal laws and policies, including, but not limited to, the following:

National Forest Management Act of 1976 (NFMA) and the implementing regulations of NFMA (36 CFR 219);

National Environmental Policy Act of 1969 (NEPA) and the implementing regulations established by the Council of Environmental Quality (CEQ) in 40 CFR 1500-1508 and the U.S. Forest Service (Federal Register Vol. 50, No. 121, June 24, 1985);

Clean Air Act Amendments of 1977;

Endangered Species Act of 1973;

Forest and Rangeland Renewable Resources Planning Act of 1974;

Wild and Scenic Rivers Act of 1968;

Porter Colonge Water Quality Control Act of 1989; and the

Clean Water Act.

### **Forest Plan Standards and Guidelines**

All alternatives implicitly include the requirement that the Eldorado National Forest Land and Resources Management Plan (LRMP) Standards and Guidelines, as currently amended, for the appropriate Management Area are included in the execution of any project related activities. California Spotted Owl Adaptive Management Strategies, if approved by the Regional Forester or the Forest Supervisor in specific situations, would meet the LRMP Standards and Guidelines for the California Spotted Owl. Within this EIS, some of the Standards and Guidelines may be specifically discussed for purposes of clarification or emphasis; however, all relevant Standards and Guidelines are applicable.

## Best Management Practices and Watershed Improvement Needs

Streamside management zones (SMZs), water quality and riparian areas will be protected in identical fashion in Alternatives B-E as defined in the Best Management Practices (BMPs). Refer to Appendix A for specific BMPs for the protection of water quality and riparian areas. The appendix includes specific direction on how each BMP is implemented, identification of other projects where the BMPs have been applied and, where applicable, the identification of unit-specific BMPs to be applied. Because of the relatively high amounts of ground disturbance that would be incidental to the implementation of Alternatives B-E, several non-standard mitigation activities would be universally applied. These include: 1) one-end suspension of all skidded logs and biomass; 2) ripping and grass-seeding, by Purchaser, of all landings that are used that are outside the roadbed of permanent roads; 3) post-project ripping and grass-seeding of all other Forest Service landings not expected to be used within 5 years in watersheds that exceed the Threshold of Concern (TOC); and 4) post-project ripping, grass-seeding and closure of all Forest Service temporary roads in watersheds that exceed the TOC.

Several specific non-standard recommendations have been made for certain streamside management zones. In particular, expanded SMZ protection will be afforded to all Class III streams in T11N, R13E, Section 25, including a 50-foot no harvest zone, a 100-foot equipment exclusion zone, and cutbanks which would not exceed two-feet near skid trail stream crossings.

There are existing Watershed Improvement Needs (WIN) activities planned for other projects within watersheds that are also common to the Whale Rock project (see Appendix G for details). These activities will proceed *independent of this project* and are listed here for information:

1. The obliteration and restoration of two segments (0.5 mile total length) of an abandoned road in the Soldier Creek Watershed. This work will be conducted in 1996 with funds collected from the Black Flag Insect Salvage Timber Sale;
2. Ripping and grass-seeding of four landings in the Lower Silver Creek Watershed (T11N, R13E, Section 1). This work is also tied to the Black Flag Insect Salvage Timber Sale.
3. Additional watershed improvement work, such as ripping of landings, grass-seeding, road closures and skid road ripping in progress within the area of the Cleveland Fire. Some of the work is located within the Riverton Watershed which is also common to the Whale Rock project.

In addition to the above watershed improvement activities, all Action Alternatives include the following watershed improvement proposals:

Repair of an existing waterhole located in Little Soldier Creek. Repair work will include the rocking of waterfill site and the repair of berms around site. Since



this waterhole is located in the vicinity of proposed harvest units that are common to all alternatives, the repair could be accomplished regardless of alternative selected.

In addition, there would be 15 landings treated in Riverton Watershed, 9 in Pacific House, 11 in Jaybird, 15 in Soldier Creek, 14 in Round Tent, and 12 in Sunset. The additional skid roads that would be ripped/subsoiled or obliterated include approximately three miles in the Riverton Watershed, one mile in Pacific House, two miles in Jaybird, three miles in Soldier Creek, and one mile each in Lower Silver, Round Tent and Sunset. Additional watershed improvement work as identified in the Riverton Rehabilitation Plan (Boyd 1995) and the Soldier Creek Rehabilitation Plan (Farley 1995) will be implemented (see Appendix G). These plans include such measures as ripping of landings, grass seeding and road closures, including the obliteration of road 11N64A in Round Tent Watershed.

Finally, alternative-specific watershed improvement projects are detailed in the watershed appendix (Appendix G) of this document. The accomplishment of these alternative-specific activities would be dependent upon the alternative selected.

### **Wildlife Management and CASPO Guidelines**

Wildlife habitat will be protected, regardless of the alternative selected, through application of Regional Direction and all appropriate LRMP standards and guidelines. The following mitigation measures will be common to Alternatives B-E in order to lessen any potential impacts to wildlife:

- a. Even though surveys have been conducted for Threatened and Endangered or Sensitive species (TES), timber sale contracts will include contract clause C6.25#, which provides for the implementation of appropriate protection to any TES species discovered to be present within a timber sale area. This contract clause will allow the Forest Service the option of requiring a limited operating period or other measures deemed necessary for the protection of these species. The discovery of sensitive species not considered in the Biological Evaluation will require amendment of this document and may require amendment to the Record of Decision which in turn may require modification of portions of timber sale contracts.
- b. A limited operating period from March 1 to August 31 will be in effect for all activities within 1/4 mile of known or suspected nest stands for spotted owls and northern goshawks.
- c. For all northern goshawks believed to be nesting in the project area, 120 acre nest stands have been proposed in order to protect habitat in and around the suspected nest grove.
- d. In accordance with the California Spotted Owl Interim Guidelines implemented on January 13, 1993, a 300 acre protected activity center (PAC) has been established

around all known owl sites within the project area. Except for the adaptive management strategies outlined in specific alternatives, no harvest activity is allowed within the PAC boundary. The same restrictions apply to the 1,000 acre base habitat for SOHAs.

- e. All new roads will be closed to public access to minimize effects to wildlife and other resources.

Alternatives B-E will follow the guidelines outlined in the California Spotted Owl Sierran Province Interim Guidelines Environmental Assessment Report (CASPO; USDA Forest Service 1993a). Alternative C utilizes an adaptive management approach to include pre-burn thinning within several PACs as provided for in the CASPO Guidelines. A new Region 5 draft EIS (DEIS) proposes longer-term strategies for maintaining spotted owl viability than those under the CASPO Guidelines (USDA Forest Service 1995). The new DEIS proposes landscape-wide management activities to restore forest health similar to those proposed here (see Appendix B). Since the new draft EIS has not been finalized, activities proposed for Whale Rock remain under the CASPO Interim Guidelines.

In Whale Rock, site specific stand exams have been conducted on approximately 3,000 acres to establish existing stand parameters. The entire vegetation base within the project area did not receive stand exams. Areas that obviously would not support harvest operations (lava caps, non-productive lands, etc.) were excluded, as were areas such as streamside zones and steep-sloped lands that were not proposed as priority treatment areas for this project. Stand exam data is used to assign strata designation and applicable harvest limits.

In planning for the Whale Rock project, opportunity was given to field verify and validate protected activity centers (PACs) as prescribed in the CASPO EA (USDA 1993a). The activity centers were determined by using owl locations listed in the California Department of Fish and Game (CDFG) database which were originally delineated based on the use of aerial photos only. These boundaries then needed to be field verified to assure the best available suitable habitat was protected (USDA 1993d). Some boundaries were modified to better protect habitat for spotted owls. In the process of field verification, PAC ED-069 was determined not to contain sufficient suitable acreage to support a spotted owl pair, and no owl pairs or nest stands were found to be associated with this PAC. This PAC was delineated after the Cleveland Fire as replacement for a PAC that was destroyed in the fire and does not contain any resident owls. It was also not listed in the CDFG database. In addition, it is not possible to define a PAC in this location that would contain 300 acres of suitable habitat. Because of this, it was recommended that the PAC be dropped from the network. This will allow management of the area to improve the habitat at a more rapid pace. The deletion of PAC ED-069 was determined not to lead toward a trend for federal listing for the spotted owl. The effects of dropping this PAC are analyzed in detail in the Biological Evaluation for the Whale Rock project (Appendix B). The effects to wildlife due to activities proposed by the Whale Rock Project along with other mitigations are also described in detail in the Biological Evaluation in Appendix B.



### **Wild and Scenic River Eligibility Status of the South Fork of the American River**

Lands within the minimum 1/4 mile corridor of the portion of the South Fork of the American River deemed eligible for inclusion into the Wild and Scenic Rivers System will be managed to protect and preserve the outstandingly remarkable recreation and historical values that are present. All proposed harvest, road construction and prescribed burning proposals within the river corridor are intended to be compatible with the guidelines given in the Interim Management of Study Rivers (FSH 1909.12, Chapter 8.12).

### **Research Natural Area**

No activities are proposed within the Research Natural Area under any alternative.

### **Cultural Resource Management**

All activities will comply with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), and other pertinent laws and regulations. Compliance will be directed by the Memorandum of Understanding (MOU) between the Eldorado National Forest and the California State Historic Preservation Officer (SHPO) and any Programmatic Agreements in place between the SHPO and the Eldorado National Forest at the time projects are implemented. These documents provide for standard methods of treatment of cultural properties.

Although all the sites in activity areas could be protected by flag and avoid measures, it is not considered practical or advantageous to treat all the properties through avoidance. Seven sites, which are situated in areas where complete preservation would be difficult in the long term (i.e., sites bisected by roads, or sites located in previously established clearcuts), will be evaluated. These sites are FS No. 05-03-55-30, -64, -136, -281, -282, -283 and -357. The integrity of the sites (which include three prehistoric, two historic and two sites with mixed components) has been compromised in the past and continued protection for them will be difficult to maintain due to their location. Further detail regarding these sites is included in Appendix K.

These seven sites will be scientifically tested for their research values as per the strategies outlined in the FARM (Framework for Archaeological Research and Management on the National Forests of the North-Central Sierra Nevada; Jackson et al 1994). This work will be conducted in consultation with local Native American groups or traditional users of the area and in concurrence with the State Office of Historic Preservation. The evaluation will involve close inspection of the ground, some subsurface excavation, metal detecting, and archival research, as appropriate. Field investigations will involve placing a number of shovel transect units (STUs) across the sites. The STUs are generally 50 x 100cm, excavated in 10 or 20cm increments to assess the presence, type, or absence of cultural materials. Cultural material will be analyzed in the field, and all non-diagnostic material will be returned to the STU from which it was obtained. The dirt will then be returned to the holes and duff replaced on the surface at the close of the investigations. Upon completion, a report documenting the findings will be prepared and submitted to the State



Office of Historic Preservation. Additional details regarding the sites, management contexts, and the minimum number of STUs planned at each are included in Appendix K.

If any of the seven sites are determined to have high research values or to be eligible for inclusion in the National Register of Historic Places, they will be flagged and avoided during the Whale Rock project. If found to have low values and to be ineligible for listing in the National Register, they will be released from management, or conservation measures will apply, such as interpretation. Conservation will allow project activities to occur on the site, while conserving some of the site's cultural components.

Archaeological properties have inherent value in reflecting past land use, lifeways, and environmental or ecosystem management. This project provides an opportunity to evaluate and interpret some of these sites, and to increase the public appreciation for prior land use in this region of the Sierras. Interpretive signing is currently planned for FS No. 05-03-55-64. This collapsed historic cabin and hydraulic mine is associated with one of the early Euroamerican homesteaders in the area. In addition to increasing the quality of public education and enjoyment, information obtained through evaluation would contribute to the advancement of knowledge and understanding of the area's cultural history and would aid in addressing research questions important to regional researchers.

If sites *have not been* evaluated for their significance, they will be avoided during ground-disturbing activities. Avoidance, as stipulated in the MOU, is accomplished by:

- a. assuring that all areas to be subject to ground disturbance are adequately inventoried in order to identify all archaeological and historical sites; at present, inventories in Whale Rock are considered adequate to have located the resources predicted to be present in the project area;
- b. recording and mapping all identified sites to professional standards; adequately designating identified sites so they can be physically avoided during project implementation; and
- c. monitoring during and after project implementation to assure that sites have been avoided.

The MOU also states that in the event that a site cannot be avoided or reasonably protected, the treatment program outlined in 36 CFR 800 and Section 106 of the NHPA will be followed to mitigate the potential effects. In this case, and in consultation with SHPO and the Advisory Council on Historic Preservation, the Eldorado National Forest is required to:

- a. consult with contemporary groups who have historic ties to the landscape;
- b. evaluate the site to determine its eligibility to the National Register of Historic Places;

- c. if eligible, address adverse effects to eligible properties through a mitigation plan; after completion of the mitigation measures, project activities would proceed; or
- d. if not eligible, the area would be made available for other resource activities.

By following the above procedures, none of the alternatives will have an effect on cultural resources. Additional management actions, management opportunities, and/or mitigations specific to each alternative are discussed within the relevant Alternative description.

### **Hardwood Management**

Protection of existing hardwood stands and individual trees will be emphasized. In order to protect hardwood trees from excessive logging damage, conifers will not be harvested from specific mixed conifer/hardwood stands where the hardwood component is sufficiently dense as to interfere with the operation of logging equipment. Within the analysis area, approximately 200 acres of these mixed conifer/hardwood stands, located in the General Forest Zone, will be excluded from harvest. Numerous other areas of hardwood dominated stands, primarily located on low-site timber areas, will also be precluded from harvest under all Alternatives because of a general lack of conifers. Minor numbers of hardwood trees in other areas may be removed, for instance, in proposed road rights-of-way, in areas where unavoidable damage during proposed harvest operations may occur, or for safety needs identified during the construction of fire lines for post-sale prescribed burning.

### **Snag and Down Log Management**

In Alternatives B through E, snags will be managed to meet the LRMP requirements for proposed harvest units or stands. Snags which are determined to be hazardous to roads open to the public will be felled, and snags in excess of LRMP standards will be felled in all harvested areas to reduce fire and personnel hazards (see the following section). All felled snags and existing down logs that can be skidded in lengths greater than 10 feet that are in excess of LRMP standards will be removed during proposed harvest operations. The largest down logs present in each harvest area will be selected for retention to meet the LRMP minimum requirements. Disturbance of large down logs will be minimized by including requirements in the contract that provide appropriate protection.

### **Roadside Hazard Tree Management**

As an agency that manages road systems that are open to the public and encourages the use of public lands, the Forest Service has a responsibility to operate and maintain the roadways in a safe condition. Safe roads are included as an area of Forest Service responsibility in accordance with the regulations implementing the Highway Safety Act (23 U.S.C., sections 401-410). Regulations governing highway safety program standards applicable to the Forest Service are found at 23 CFR Part 1230, and Forest Service policy regarding highway safety standards are found at FSM 1535.11 (Memorandum of Understanding with the Federal Highway Administration) and ID 7730-92-3, July 31, 1992 (Highway Safety Program).



The Forest Service Transportation System Maintenance Handbook (FSH 7709.58, 12.6-2) specifies that hazard tree removal is an appropriate activity for Maintenance Level 3, 4 and 5 roads. These roads are to be managed in accordance with the requirements of the Highway Safety Act. Partially in response to four fatalities caused by hazard trees on Forest Development Roads on the Angeles and the Eldorado National Forests, the Regional Forester re-emphasized the need to deal with hazard trees in letters to all Forest Supervisors, dated 9/4/91 and 10/27/92. In addition, new proposed federal logging safety standards may require that all snags and hazard trees in areas where workers are operating be felled or avoided. If enacted, workers can get no closer than two tree lengths to the snag or hazard tree, unless it can be demonstrated that a shorter distance is safe (29 CFR 1910 and 1928, Section (h)(vi), p. 51746).

In response to the above direction, in 1995 the Pacific District will be conducting roadside hazard tree removal operations on selected roads across the District, including some roads within the Whale Rock analysis area. However, since a high incidence of tree mortality is an ongoing and continuous feature of the present forest environment, it is expected that additional hazard trees will develop along roads within the Whale Rock project area. Therefore, as part of the Whale Rock project, hazard trees capable of hitting permanent roadways open to the public would be felled to assure safety to forest workers and the public. For purposes of this project, hazard trees are defined as trees that are dead or dying, as determined by Forest Service markers in accordance with existing District marking guidelines.

### **Sugar Pine Management**

The Peavine Ridge Rust Resistant Seed Production Area was established in 1992 and is located within the Whale Rock Project area. Within the seed production area are four sugar pine trees that have been tested and found to be resistant to white pine blister rust. Other sugar pine within the seed production area are undergoing testing. This area has proved to have a higher than normal incidence of rust resistant sugar pine than general forest stands in the central Sierra Nevada (Eldorado National Forest 1992:1).

Sugar pine trees are present throughout the sale area. In addition to the sugar pine within the seed production area, there are 2 additional rust resistant and 35 potentially resistant sugar pine within the remaining Whale Rock project area. Seed has been and will continue to be collected from the proven resistant trees for outplanting. It is likely that additional rust resistant sugar pine exist within the project area. No tested, rust resistant or candidate rust resistant sugar pine will be harvested under this project and all the resistant and potentially resistant sugar pine will be protected contractually from harvest-associated damage. Pole size or larger sugar pine trees that are thrifty and visually free of blister rust will not be harvested.

Any prescribed burns adjacent to tested rust resistant sugar pine will be conducted in such manner as to provide protection to the trees. Needed protection may include hand removal of ground and ladder fuels and hand construction of fire lines at the base of the trees to prevent girdling by the fire.



### **Lava Caps**

There are a number of lava cap areas (i.e., open, rocky areas that are part of an ancient mudflow now known as the Mehrten Formation) within the Whale Rock project area that support unique plant communities. Under all alternatives, those portions of the lava caps specifically identified by the District or Forest botanist for preservation will be protected from project related disturbance by boundary posting and contractual requirements. On roughly 240 acres, there is a desire to conduct prescribed burning in order to achieve or maintain the desired condition for the lava cap (see map in Appendix E).

### **Sensitive Plants**

Field surveys or office evaluation of all areas subject to ground disturbance have been completed, and known sensitive plant occurrences have been recorded and mapped. All management activities will comply with the LRMP and will be protected by flagging and avoiding, except in those cases where prescribed sensitive plant enhancement burns are to be accomplished. Enhancement burns are planned for yellow bur navarretia and Pleasant Valley mariposa lily as a measure to rehabilitate the habitat that has been overtaken by chaparral species. These areas will be monitored to assess the effectiveness of prescribed burning efforts. Locations with Stebbins' phacelia and saw-toothed lewisia will be avoided as no project activities are expected to take place near their occurrences.

### **Prescribed Burning**

Prescribed burning is recognized as being an essential management practice if the Whale Rock project area is to be returned to the desired condition described in this document. The amount of acreage that will be burned varies by alternative since it is to some extent dependent upon seasonal precipitation and acres prepared for treatment through harvest entry, and directly dependent upon funding available from stumpage receipts collected from harvest. In general, burning will be initiated 1-3 years after harvest on select acres that are in prescription, with completion of the burn cycle occurring within 7 years after initiated. All burning proposed in PACs will be the light understory burning allowed by the CASPO Interim Guidelines.

There are a number of acres within the project area where prescribed burning is desirable and feasible without a pre-burn harvest entry. These areas are located in situations of naturally occurring low fuel loads, such as lava caps, brushfields and previously prescribed burn areas. However, in order to generate sufficient funds for prescribed burning in these non-harvest areas, it would be necessary to use stumpage receipts from areas subject to harvest. This is feasible, provided the non-harvest burn areas are within the general vicinity of harvest areas. The estimated burn acreage presented under each alternative reflects these factors.

## Roads

All proposed new construction or reconstruction roads would be the minimum necessary to meet the needs for commercial use and/or watershed protection needs. Since Alternatives B-E include a degree of biomass removal, all roads used would need to accommodate chip-van hauling. In order to reduce the impacts of existing and proposed roads, a number of construction and reconstruction requirements intended to reduce watershed and wildlife effects would be included in Alternatives B-E. The most noteworthy items include the grass-seeding or hydro-seeding of all new fill and cut slopes over two feet in height. Numerous segments of existing road would be rocked primarily for watershed improvement benefits in order to reduce creek sedimentation from road surface loss. The exact length of road to be rocked will vary among alternatives because different road segments would be used in different alternatives (Appendix G).

On roads previously unavailable for public use because of roadbed condition, gates would be included as part of the reconstruction package to control seasonal use. Additional information on road specifications is included in Appendix D. Each alternative description contains information on miles of road construction and reconstruction that is specific to that alternative.

## Harvest Operations, Slash Treatment and Prescriptions

Alternatives B through E propose to treat existing vegetation and fuels in order to achieve the identified Desired Condition for Whale Rock and replace volume from the Cox Canyon Timber Sale. The areas to be treated vary among alternatives. The general management prescription for each area selected for treatment is the same for all alternatives: i.e., biomass removal and understory thinning. The specific prescriptions in terms of volume or tonnage to be removed vary between treatment areas based upon measured stand conditions and harvest objectives. The measured information is primarily associated with average stand diameter, existing basal area and in some stands, percentage of crown closure.

Commercial harvest would occur as the initial treatment on selected areas capable of supporting such operations. The areas considered and selected for harvest vary by alternative. Certain areas that would not support commercial harvest operations would have prescribed burning as their initial treatment. Figures 2 through 10 show areas proposed for activities in each alternative.

The determination of which areas to treat was based initially on assessments of locations needing thinnings and fuels reduction to meet the desired condition. The areas finally selected for treatment were those that could also support commercial operations based upon field review and economics. Economic feasibility was determined on the basis of the amounts of sawtimber and biomass to be removed, the difficulty of access and other relevant factors that might affect the economics of the operation.



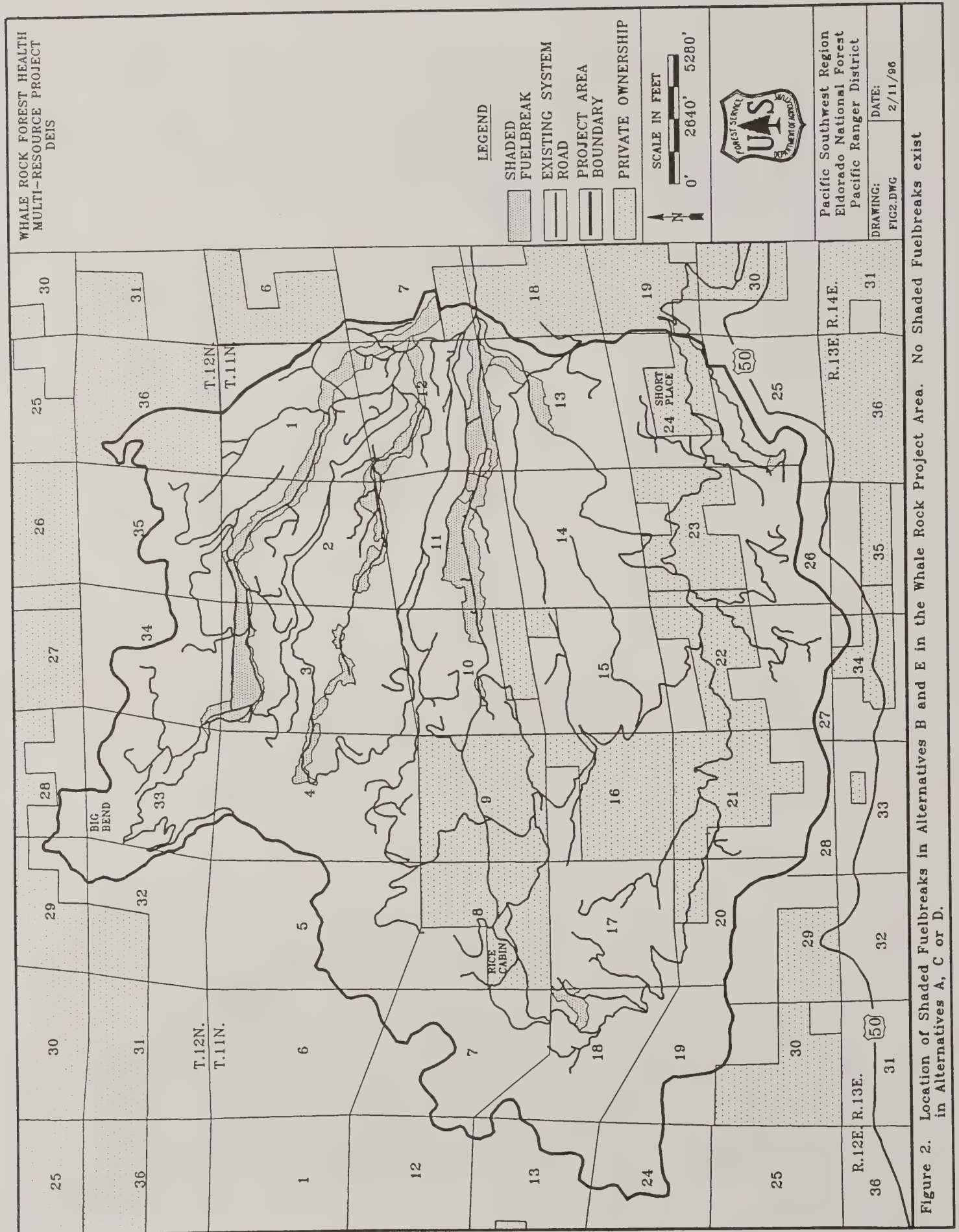
Alternatives B through E propose the removal of selected live and dead merchantable trees (sawtimber) and associated topwood and limbwood (biomass), live sub-merchantable trees (biomass) and down, non-merchantable logs (biomass) by commercial harvest operations. Sawtimber size classes to be removed would vary among units, depending upon existing stand characteristics and management objectives (i.e., fuelbreaks, etc.). Biomass operations would remove tree sizes primarily between 4 and 9.9 inches d.b.h. *No planting is proposed in any of the alternatives.*

The shaded fuelbreaks in Alternatives B and E (see Figure 2) would retain trees in the fuelbreaks of various species and sizes with the intent to have tree spacing approaching 20 feet between crowns. The number of trees retained on a per-acre basis would vary depending upon crown diameters of the trees left standing. In the two stands within proposed fuelbreaks which meet the criteria for select stands in terms of spotted owl value, the canopy closure retained would meet the 40% guideline. Where available, a minimum of 50 square feet basal area would be retained in ponderosa pine. The shaded fuelbreaks would be used for wildfire fighting purposes and as cornerstones in the post-sale prescribed burning program. In the long term, the shaded fuelbreak system would become less important as the entire Whale Rock project area becomes more resilient to catastrophic fire events because of landscape level changes in fuel loading and risk (see Appendix F). In the short term, shaded fuelbreak maintenance is expected to be necessary. Dead trees would continue to be removed when the numbers exceed minimum LRMP guidelines and low growing vegetation would be treated either mechanically or by prescribed burning to prevent the redevelopment of fuel ladders and unacceptable fuel loadings.

Outside the shaded fuelbreaks, the goal would be to achieve a live tree spacing of approximately 20 feet between tree trunks; however, this spacing will vary depending upon stand characteristics, such as average tree size. A 20 foot spacing equates to approximately 100 trees per acre. Because of the CASPO requirements pertaining to the retention of the larger trees, tree spacing will actually vary considerably across the proposed harvest areas. Post-harvest prescribed fire will be used both within and between the selected harvest units to further the fuels treatment initiated with commercial operations.

Mechanized harvest systems, such as cut-to-length (CTL) equipment or feller/bunchers, would likely be used to cut the trees. The falling of trees using timber fallers and sawyers would also be acceptable and expected, particularly in those instances where mechanized equipment would be precluded because of large tree size or position. CTL systems process trees into logs at the stump and employ rubber tired forwarders to carry the logs to the landing. Feller/buncher operations use conventional rubber tired equipment or tractors to skid mechanically felled trees to the landing where the processing of the trees into logs occurs. CTL equipment, which is generally much larger than feller/buncher equipment, is most suitable in areas that are quite open. CTL equipment leaves all residual slash near the stump. Within fuelbreaks on the Whale Rock project, CTL equipment would be optional. Outside of fuelbreaks, CTL equipment would be precluded,





unless it could be demonstrated that residual fuel load objectives could be met. All skid equipment would have the capability of providing one-end suspension of all products.

Harvest prescriptions will meet LRMP/CASPO guidelines. Within the LRMP/CASPO guidelines, trees selected for retention will be chosen on the basis of form, vigor, spacing and species. In most instances the proposed, individual stand prescriptions in the Whale Rock alternatives are more conservative than the 'maximum' LRMP prescriptions in terms of percentage of the basal area proposed for removal (i.e., less basal area will be removed than the amount allowed by the LRMP guidelines). Data collected from 2,200 acres of stand exams in natural stands indicate that approximately 6 MBF per acre would be harvested compared to a LRMP/CASPO "maximum" limit of 11 MBF per acre based on measured stand conditions. Additional harvest and unit-specific prescription details are included in Appendix C.

Slash disposal requirements, coupled with post-harvest prescribed burning, would be directed towards a resultant fuelbed that would support flame lengths of 4 feet or less during burning conditions that include a fine fuel moisture of 3%, midflame wind speed of 4 miles per hour on a 30% slope with a live fuel moisture of 70 percent. With a flame length of 4 feet or less, the scorch height would not exceed 23 feet and mortality would not exceed 25% on ponderosa pine that are 56 feet tall or taller (Mackey 1992). Upon completion of the follow-up prescribed burning, the fuelbed should resemble Northern Forest Fire Laboratory Fuel Model 9, i.e., a closed stand of long needle pine (most south aspects are currently in N.F.F.L. fuel model 10, while northern aspects are in fuel model 8). For additional information, see Appendix F.

Contractual slash disposal requirements would be minimized by the biomass operations; however, there would be some slash generated by the proposed harvest operations that would require treatment. Most of this treatable material would be generated from brush and conifer saplings below the 4 inch minimum d.b.h. limit that are damaged beyond recovery by the operations. This small sized material, if greater than 5 feet tall, would be felled by the logging operation to reduce fuelbed height. In addition, other slash, such as broken tops and limbwood that escape the biomass operation, would be treated by lopping and scattering to within 18 inches of the ground. Slash within 100 feet of surfaced roads or 50 feet of unsurfaced roads would be piled by the logging operation for Forest Service burning. It is expected that after harvest operations are complete, it would be necessary to use a small brush rake equipped tractor to pile concentrations of existing natural fuels. These piled areas would be burned prior to other prescribed burning. The effects of this piling has been included in the cumulative watershed effects analysis for this project.

### **Project Implementation**

Alternatives B through E involve various levels of commodity harvest that would be accomplished by means of one or more timber sale projects. The number, timing and duration of the timber sale project(s) will be dependent upon the alternative selected. It is anticipated that 2 to 5 timber sales may be generated by the various alternatives. The



sales would be offered during the 1996-1999 fiscal years with each sale having a 1 to 3 year period for completion of contractual requirements. Prescribed burning would extend for a 7 year period after harvest is initiated on each sale. *No planting or other regeneration prescriptions would occur subsequent to implementation of any of the alternatives.*

## ALTERNATIVE DESCRIPTIONS

The alternative descriptions begin with a No Action Alternative (Alternative A). Alternatives B through E entail varying levels and intensities of management activities to meet the desired condition for Whale Rock. Each alternative incorporates the background information on the existing condition and affected environment that are found in Chapter III. Readers not familiar with the environment and conditions in the Whale Rock area would find it useful to read Chapter III before proceeding to the description of the alternatives. Information that applies to all 'action' alternatives has been discussed in the preceding section. The section following the alternative descriptions outlines how effectively each alternative addresses the issues identified for the Whale Rock area. *Mitigation measures common to all the action alternatives are included at the end of Chapter IV.* Alternatives that were considered, but not analyzed in detail, are briefly described at the end of this chapter.

### Alternative A: No Action

This is the 'No Action' alternative required for consideration under the National Environmental Policy Act (NEPA). The main objective of this alternative would be the perpetuation of the existing conditions across the area. The emphasis of this alternative is that no action would occur within the analysis area. This alternative responds in part to issues 2, 6, 8, 10, 11, 12 and 13 by preventing direct disturbance from project activities to sensitive plant populations, pristine lava cap areas, late and early seral habitat areas, and cultural resources; by reducing air quality degradation from dust and smoke from project activities; by eliminating threats from project activities to scenic qualities along Highway 50 and the South Fork of the American River; and by eliminating cumulative effects from project-related activities on soils and water. Implementation of this alternative would entail no actions to reduce fire or safety hazards or to improve the health of the watershed, wildlife habitat, or forest ecosystem in general. Additionally, the Cox Canyon Timber Sale would remain in suspension.

### Alternative B: Fuels Management Emphasis

This alternative proposes to construct shaded fuelbreaks on major ridges and to treat large, contiguous areas to reduce the risk from catastrophic wildfire (see Figures 3 and 4). The emphasis of this alternative is to reduce the risk of catastrophic fire for the long term through fuel manipulation focusing primarily on ridgetops, and on south and west aspect



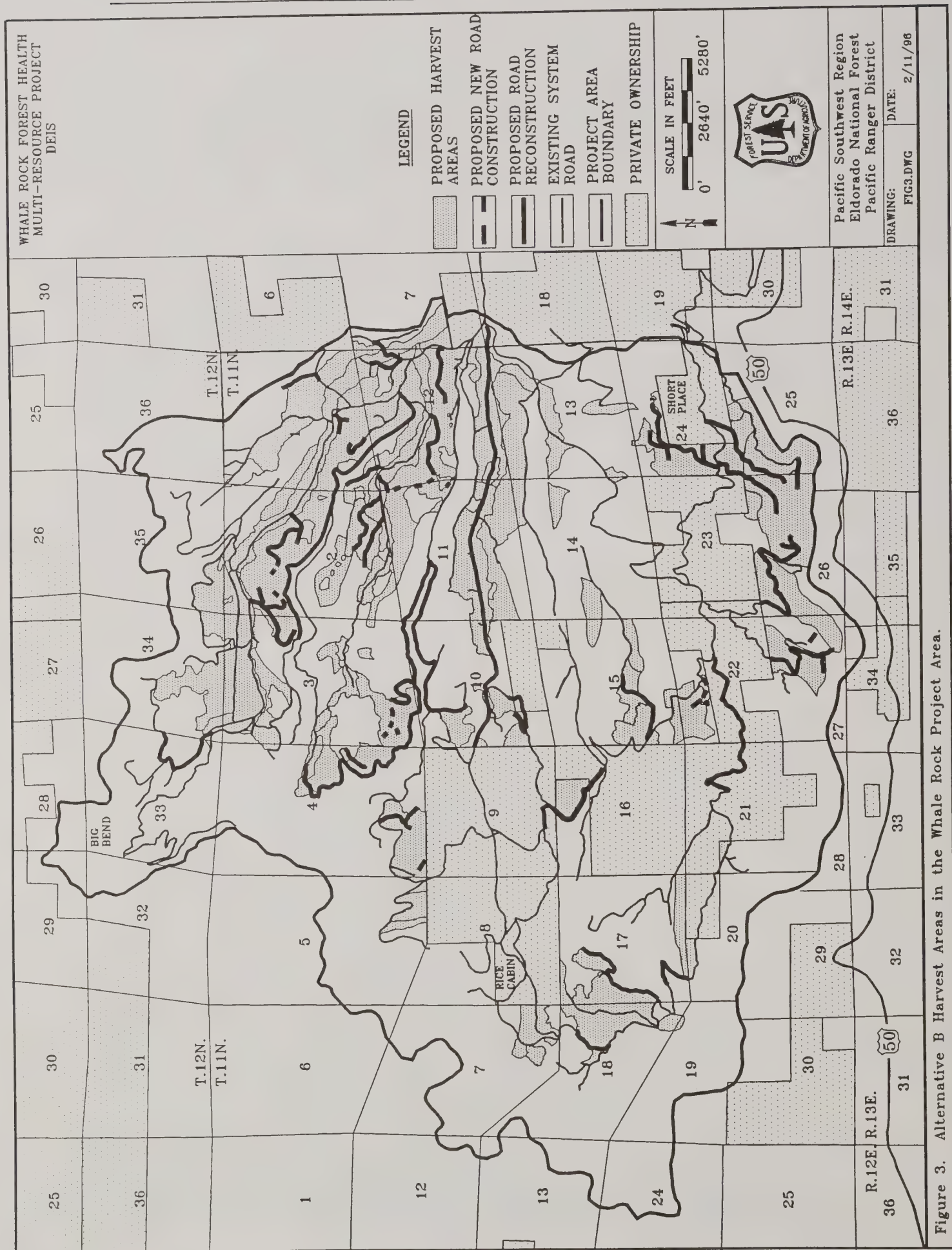
upper slopes. The treated areas are designed to be sufficiently large as to make a difference in terms of predicted fire behavior. The areas selected for fuels treatment are those most susceptible to catastrophic fire and most conducive to the use of prescribed fire. This alternative was designed primarily to address Issues 1, 3, 4, 9 and 11 to varying degrees.

Shaded fuelbreaks would retain trees of various species and sizes with the intent to have tree spacing approaching 20 feet between crowns in order to reduce the risk of large stand-replacing wildfires. The number of trees retained on a per-acre basis would vary depending on crown diameters of the trees left standing. Where available, 50 square feet basal area would be retained in ponderosa pine. The fuelbreaks would be used as a frontline defense for wildfire fighting purposes and as anchors in the post-sale prescribed burning program. Over time, the shaded fuelbreaks would become less important as the entire Whale Rock area becomes more resilient to catastrophic fires because of landscape-level changes in fuel loads. In the short-term, shaded fuelbreaks would need to be maintained by removing dead trees when those numbers exceed LRMP guidelines and by treating low-growing vegetation mechanically or by prescribed burning to prevent the redevelopment of fuel ladders and unacceptable fuel loadings.

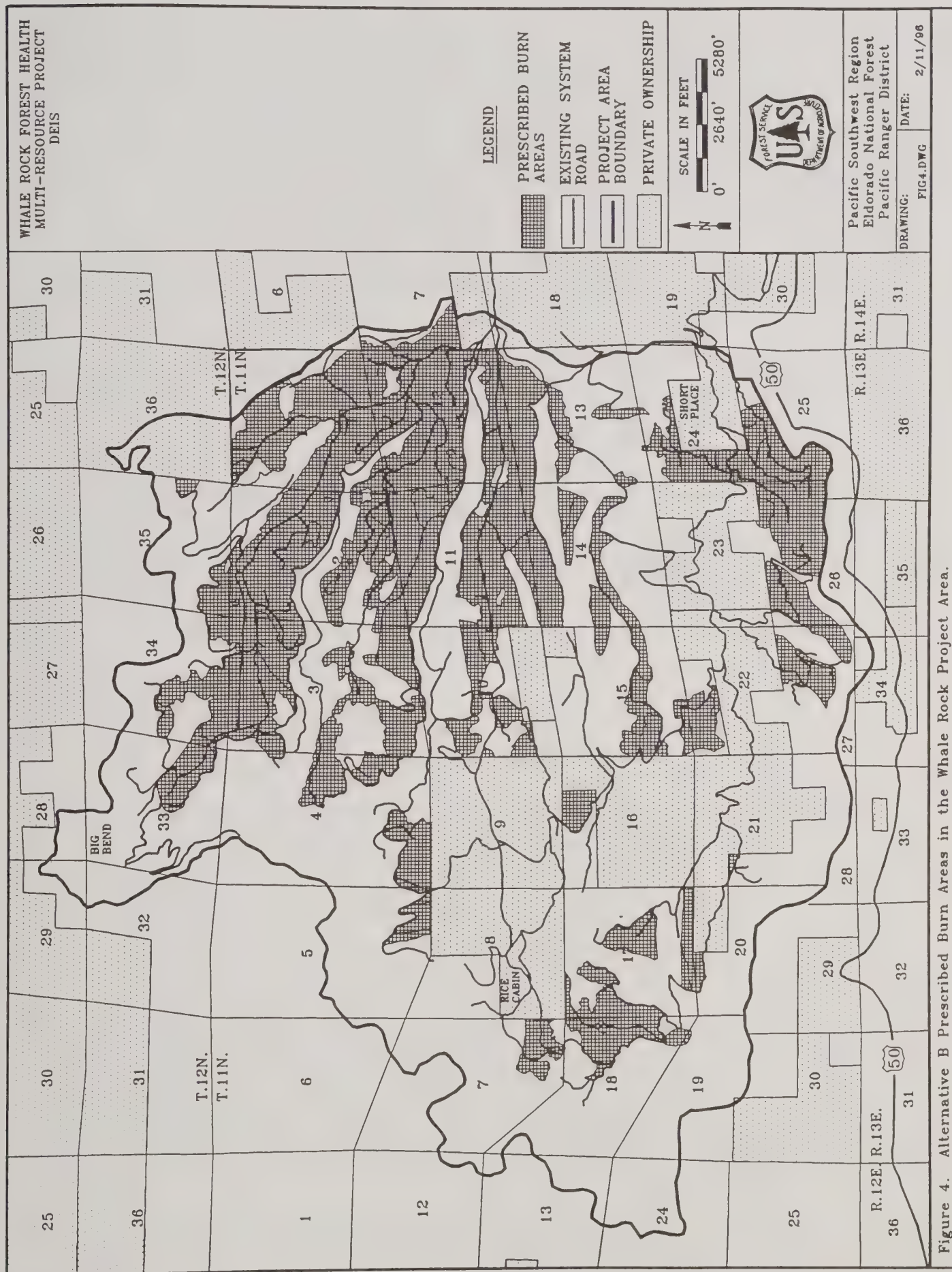
A total of 14.5 miles of constructed, shaded fuelbreaks are included in this alternative. Approximately 14 miles of shaded fuelbreaks would be constructed on major ridges, including Big Bend, Jaybird, Peavine and Telephone Ridge. Another 0.5 miles of additional shaded fuelbreak construction would occur on selected lateral ridges. Of the 14.5 miles of shaded fuelbreaks, approximately 3.5 miles are located across lava caps and young plantations where commercial harvest operations are not possible. Activities within these 3.5 miles would occur as post-sale burning or brush control; sale area improvement (SAI) funds would be available and used to construct this portion of the fuelbreak where work is needed. The remaining 11 miles of fuelbreak would be harvested under this alternative. Within proposed shaded fuelbreaks, approximately 6,135 MBF would be removed from a total of 914 acres. It is expected that these fuelbreaks would be managed at lower stocking levels for 20-25 years or until the general project area reaches an acceptable, overall fuel loading level. When desired levels of fuel loading are achieved, the shaded fuelbreaks would then be blended back into the adjacent timber stands by allowing some increase in stocking levels.

Total acres subject to fuels treatment (Figure 4) would be 6,303, with approximately 900 acres burned annually over a 7 year burn cycle. Prescribed burning would occur on 3,633 harvested acres following harvest activities. Another 1,646 non-harvest acres would also be prescribed burned, including light understory burning within 590 non-harvested acres of Spotted Owl Protected Activity Centers (PACs). Machine piling of an additional 1,024 acres would be accomplished as a post-sale activity. The lower slopes on north aspects would generally not be harvested or prescribed burned and would therefore remain in their current condition.

Harvest would include the commercial thinning of 1,124 MBF on 562 acres of 34 year old Icehouse Fire-era plantations and 15,167 MBF on 3,181 acres of natural stands. Biomass









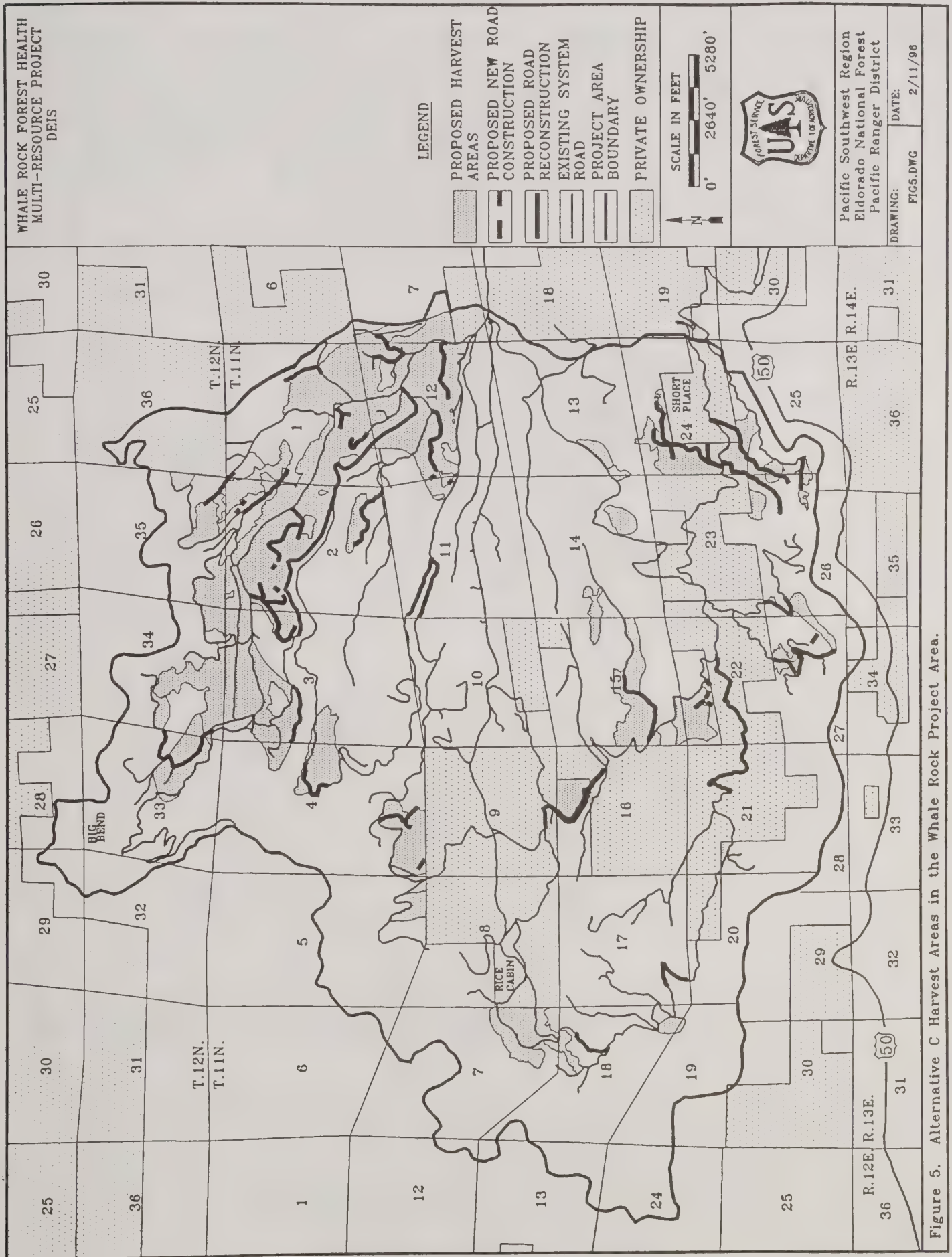
removal would occur on all areas selected for commercial thinning. Total quantities of sawtimber and biomass to be removed under this alternative are estimated at 22,426 MBF and 67,169 tons, respectively. All stands selected for harvest are capable of supporting commercial sawtimber or biomass operations. Some plantations and natural stands that cannot currently support commercial operations would be prescribed burned as a post-sale activity, and the effects of this burning are also discussed. The commercially viable plantations are the 562 acres of Icehouse-era plantations that are in the analysis area. Total acreage harvested within fuelbreaks, plantations and natural stands is 4,657. Approximately 1.7 miles of new road construction and 29.3 miles of road reconstruction would be necessary to implement Alternative B. Total cost for roadwork is estimated at \$927,125.

This alternative would cost an estimated 3.4 million dollars to implement. Stumpage collected from implementing Alternative B would be 5.2 million dollars. An estimated 292 full time, year-round jobs would be created or maintained.

Expected results of implementing Alternative B include the reduction of fuels accumulated on the ground and present as fuel ladders. Forested stands that have a dense understory and heavy fuel accumulations would become more open in nature. The prescribed burning would favor ponderosa pine establishment and growth, rather than fir or cedar, because of ponderosa pine's fire adaptation. Extensive prescribed burning proposed throughout the project area would aid in the regeneration of ponderosa pine, brush and oaks. Large snag and down log levels would likely decrease due to fire consumption during prescribed burning.

### **Alternative C: Wildlife Management Emphasis With Adaptive Management**

This alternative was developed to provide for sustainable wildlife habitat in the Whale Rock area. Habitat would be protected and enhanced through project activities including thinning and biomass removal in plantations and natural stands, including 141 acres of natural stands in three spotted owl Protected Activity Centers (PAC) as provided for under Adaptive Management Strategies in the interim CASPO Guidelines. This strategy would be employed in order to facilitate reaching the desired fuels reduction within the PACs at a faster rate than could be achieved through the use of prescribed fire alone. Many of the PACs located within the project boundary contain dense thickets of small diameter trees. These areas are providing little or no value to spotted owls while greatly increasing the risk of stand-replacing fires. Under this alternative, these stands would be thinned and prescribed burned to reduce the fire risk and to increase growth rates for the remaining trees. In the long term, this objective would be met by mimicking historic habitat patterns and successional processes which were present prior to effective fire suppression and exclusion (see Figures 5 and 6). This alternative was primarily designed to address Issues 1, 4, 6 and 7 to varying degrees.





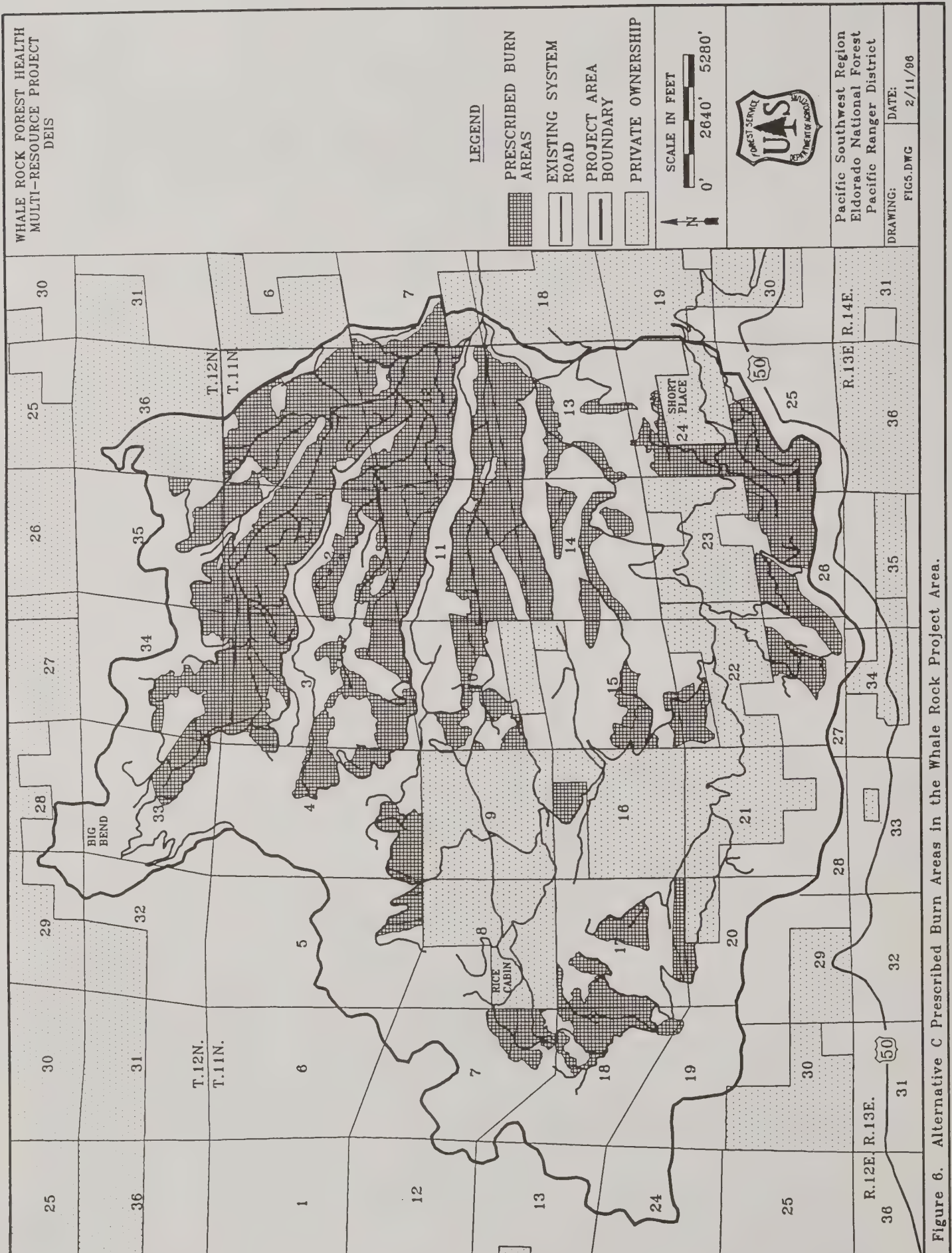


Figure 6. Alternative C Prescribed Burn Areas in the Whale Rock Project Area.



The long term goal would be to have selected stands managed for a more open ponderosa pine habitat. Between 40 and 50% of the area would eventually be dominated by large ponderosa pine with approximately 40% canopy closure. Approximately 20% of the area would be managed for the Montane Hardwood Conifer WHR (Wildlife Habitat Relationship) type. Canopy closures in these areas would range from 40% on south facing slopes to 60% on north facing slopes. Another 20% of the project area would be managed for the Sierran Mixed Conifer type. This type would occur along main drainages such as Jaybird Canyon and Soldier Creek. The canopy closure here would be the highest within the project boundaries, ranging from 60 to 100%. Interspersed throughout the area (5-10%) would be pure stands of oak and open brushfields. These areas would be managed to ensure regeneration of new vegetation.

The natural stands and plantations selected for entry are those that are capable of supporting commercial sawtimber and biomass operations. Harvest activities will occur on 2,548 acres in this alternative. Harvest would initially occur by commercial thinning of 1,124 MBF from 562 acres of existing older plantations and 11,840 MBF from 1,986 acres of natural stands (included in the natural stand estimate would be the harvesting of 141 acres within three selected PACs). In addition, 352 acres in portions of four PACs would receive light understory burning without a prior harvest entry.

Management activities would tend to be concentrated on the upper slopes without respect to aspect. Biomass removal would be emphasized in areas that currently support substantial quantities of understory vegetation. Quantities of sawtimber and biomass to be removed are estimated at 12,964 MBF and 31,895 tons, respectively.

Fuels treatments would occur on a total of 5,623 acres, with approximately 800 acres burned annually over a 7 year burn cycle. A total of 2,086 harvested acres would be subject to post-harvest prescribed burning. Prescribed burning would also occur on 3,075 non-harvested acres, including 352 acres of non-harvested PACs. Some young plantations and natural stands that cannot currently support commercial operations would be prescribed burned as a post-sale activity. Machine piling would occur on 462 acres and the piles burned. There would be no shaded fuelbreaks constructed under this alternative.

Approximately one mile of road construction and 19.2 miles of road reconstruction would be necessary to implement this alternative. These improvements would cost an estimated \$541,300.

This alternative would cost an estimated 2.5 million dollars to implement. Stumpage collected from implementing Alternative C is estimated to be 3.1 million dollars. An estimated 166 full time, year-round jobs would be created or maintained.

The expected results of implementing Alternative C would be the improvement of wildlife habitat through thinning and fuels reduction. Forested stands that have a dense understory and heavy fuel accumulations would become more open in nature. Activities proposed under this alternative would aid in the process of returning the dominant habitat type to Ponderosa Pine. Extensive prescribed burning proposed throughout the project area would

aid in the regeneration of new growth of shrubs and oaks. Harvest and thinning within PACs would aid in reducing the risk of loss of the PACs to wildfires through the reduction of fuel loads and ladder fuels. Snags and down log levels would likely experience a decrease due to fire line construction and incidental loss through burning.

### **Alternative D: Timber Management Emphasis**

The emphasis of this alternative is enhancing forest health primarily through the intensive management of the capable, available and suitable lands for timber production. Continued reliance upon wildfire exclusion would be the long term management strategy, although some improvement in catastrophic fire resilience would be expected in those stands selected for entry for sawtimber or biomass removal.

For purposes of improving the health of select timber stands, this alternative proposes thinning of all existing, older plantations and specific natural stands. The natural stands and plantations selected for entry are those that are capable of supporting commercial sawtimber or biomass operations. Stands identified for entry would be primarily selected on the basis of opportunities to maintain or improve the health, sustainability and long-term yield of wood products in accordance with the approved Forest standards and guidelines for the pertinent management areas. This alternative was primarily designed to address Issues 4, 5 and 9 to varying degrees. Alternative D is displayed in Figures 7 and 8.

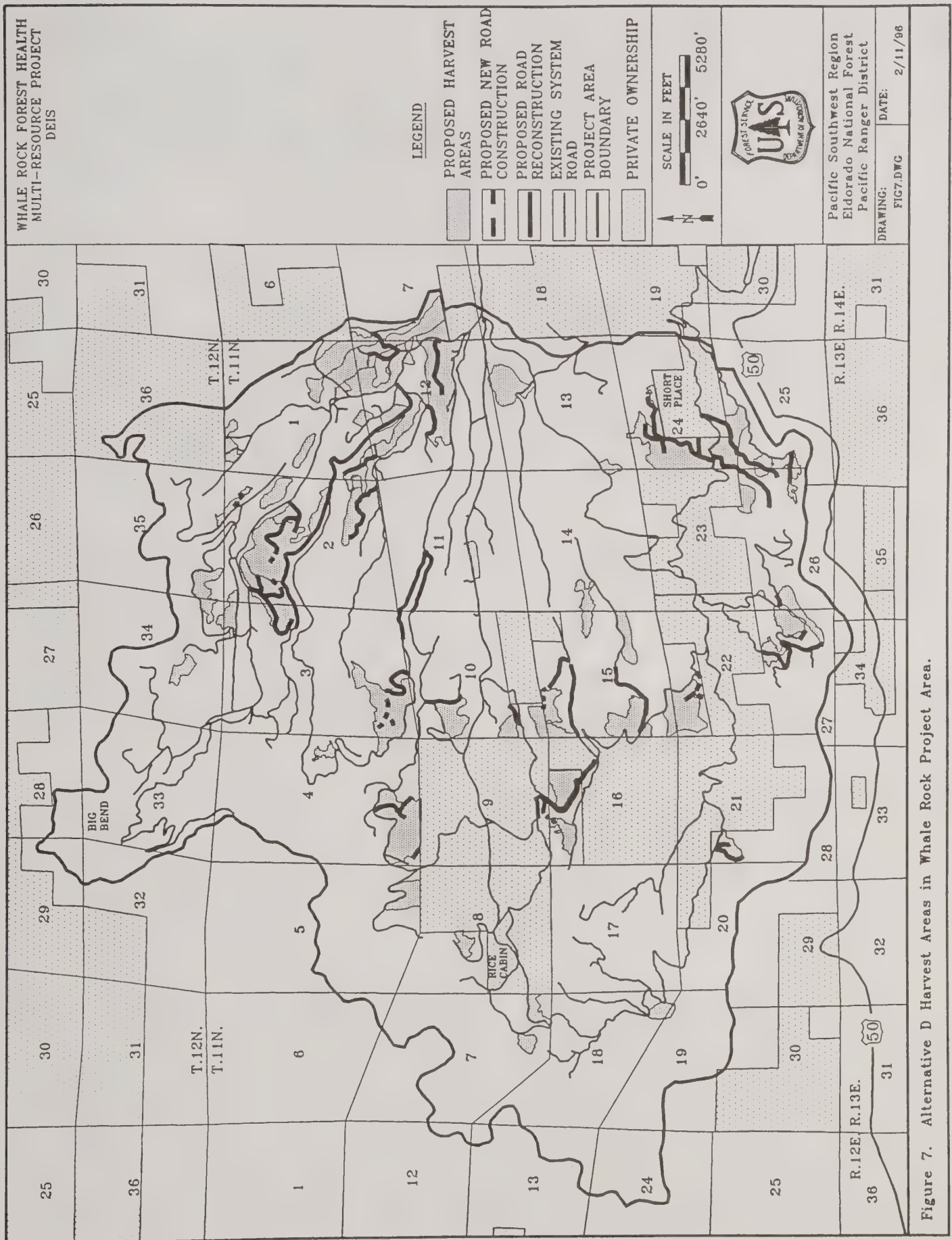
The total area supporting harvest activities will be 1,524 acres. Harvest would be limited to the commercial thinning of 1,124 MBF from 562 acres of existing plantations and 5,291 MBF from 962 acres of overstocked, pole-sized natural stands. Management activities would tend to be scattered throughout the project area, though the concentration of existing plantations in the southern portion of the analysis area would tend to create a sizeable block of treated lands in this portion of Whale Rock. Total quantities of sawtimber and biomass to be removed are estimated at 6,415 MBF and 17,240 tons, respectively.

There would be no shaded fuelbreaks constructed under this alternative, although fuels treatment would occur on 1,765 acres. Post-harvest prescribed burning would occur on a total of 1,284 harvested acres and 241 non-harvested acres. Machine piling will occur on an additional 240 acres, with the piles subsequently burned. Approximately 250 acres would be prescribed burned annually over a 7 year burn cycle.

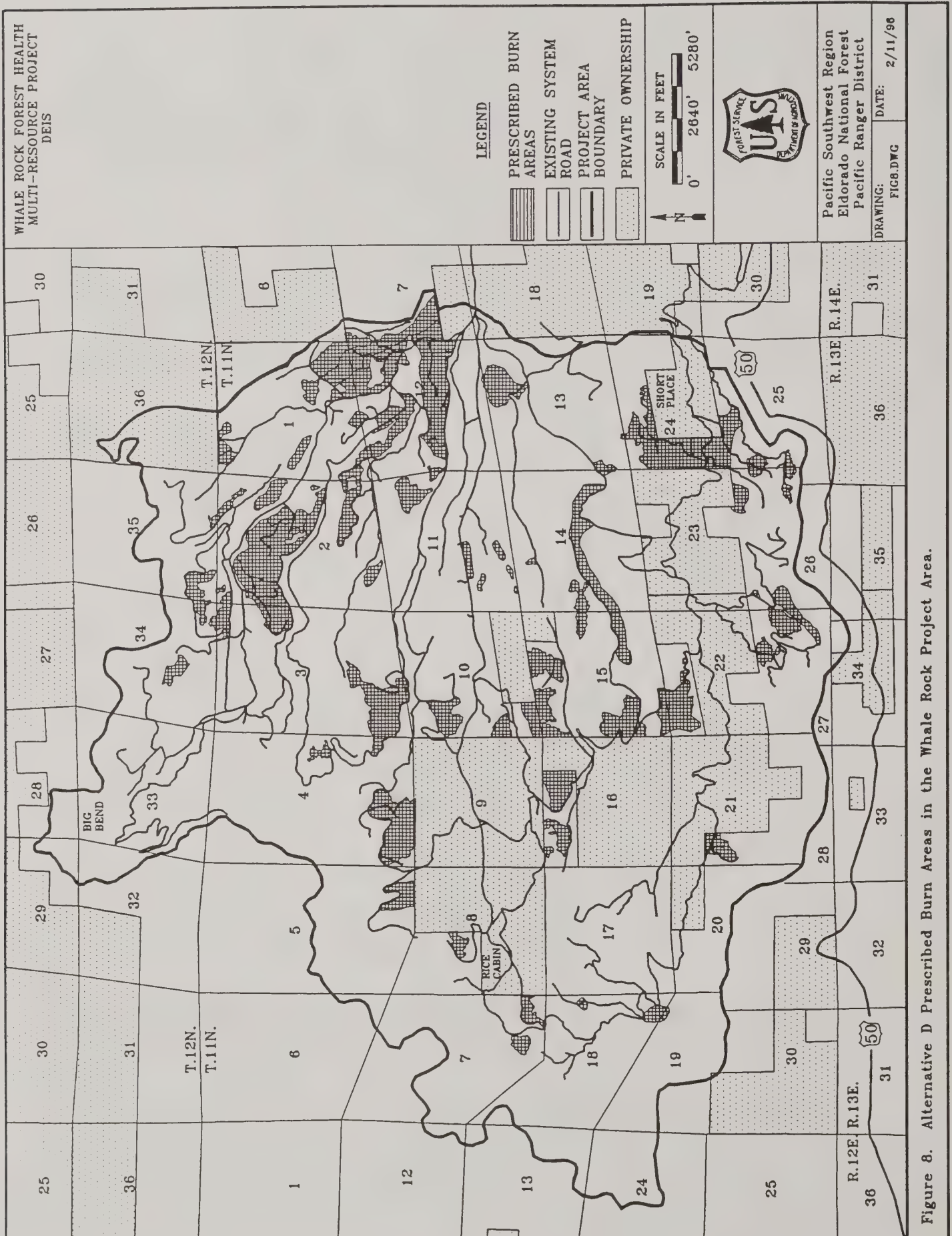
Approximately 1.6 miles of new road construction and 14.9 miles of road reconstruction would be necessary to implement this alternative. Road work would cost an estimated \$424,720 under Alternative D.

This alternative would cost an estimated 1.2 million dollars to implement. Stumpage collected under Alternative D is estimated at 1.5 million dollars. An estimated 83 full time, year-round jobs would be created or maintained.









Expected results of implementing this alternative are healthier, more productive timber stands within all existing older plantations and within selected dense, overstocked natural stands through thinning and fuels reduction. The end result would create stands that are more open and free of brush and dense, competing young-growth conifers, with growth concentrated on fewer trees. These stands would be more resilient to fire, their continued development would be more readily assured, and a greater opportunity would exist to achieve stands with a greater percentage of large trees.

### **Alternative E: Multi-Resource Management Emphasis**

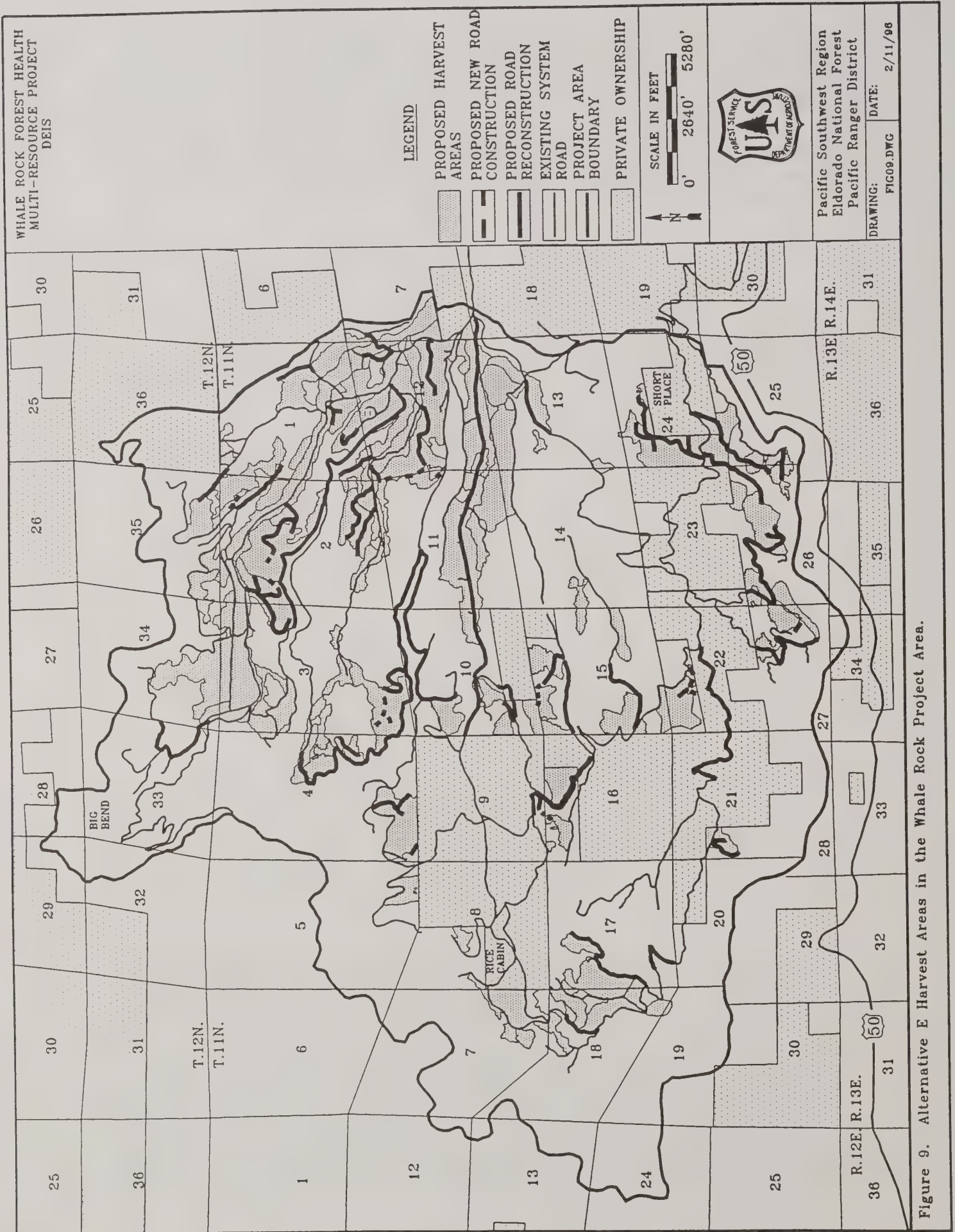
This alternative was developed by modifying and integrating several management actions proposed in Alternatives B through D. The emphasis of this alternative is to meet wildlife, fire and timber objectives by enhancing wildlife habitat and reducing the risk of catastrophic fire. This alternative proposes to construct fuelbreaks, thin natural stands and plantations, and implement an extensive prescribed burn program (see Figures 9 and 10). This alternative was designed to address Issues 1, 3, 4, 5, 6, 7 and 9 to varying degrees.

The selection of harvest units under this alternative is a reflection of the effort to balance the desirability of treatment with economic and practical feasibility. Harvest units are prioritized and selected on the basis of economics, stand conditions and locations, combined with wildlife and fuels objectives. In effect, this alternative seeks to treat those areas that have a high priority for treatment from a fuels, wildlife and timber standpoint, such that certain units determined to have a very high priority from a single resource viewpoint are proposed for harvest and subsequent treatment along with other units that provide multiple resource benefits. Management activities tend to be concentrated where mutual objectives of wildlife, fuels and timber management coincide.

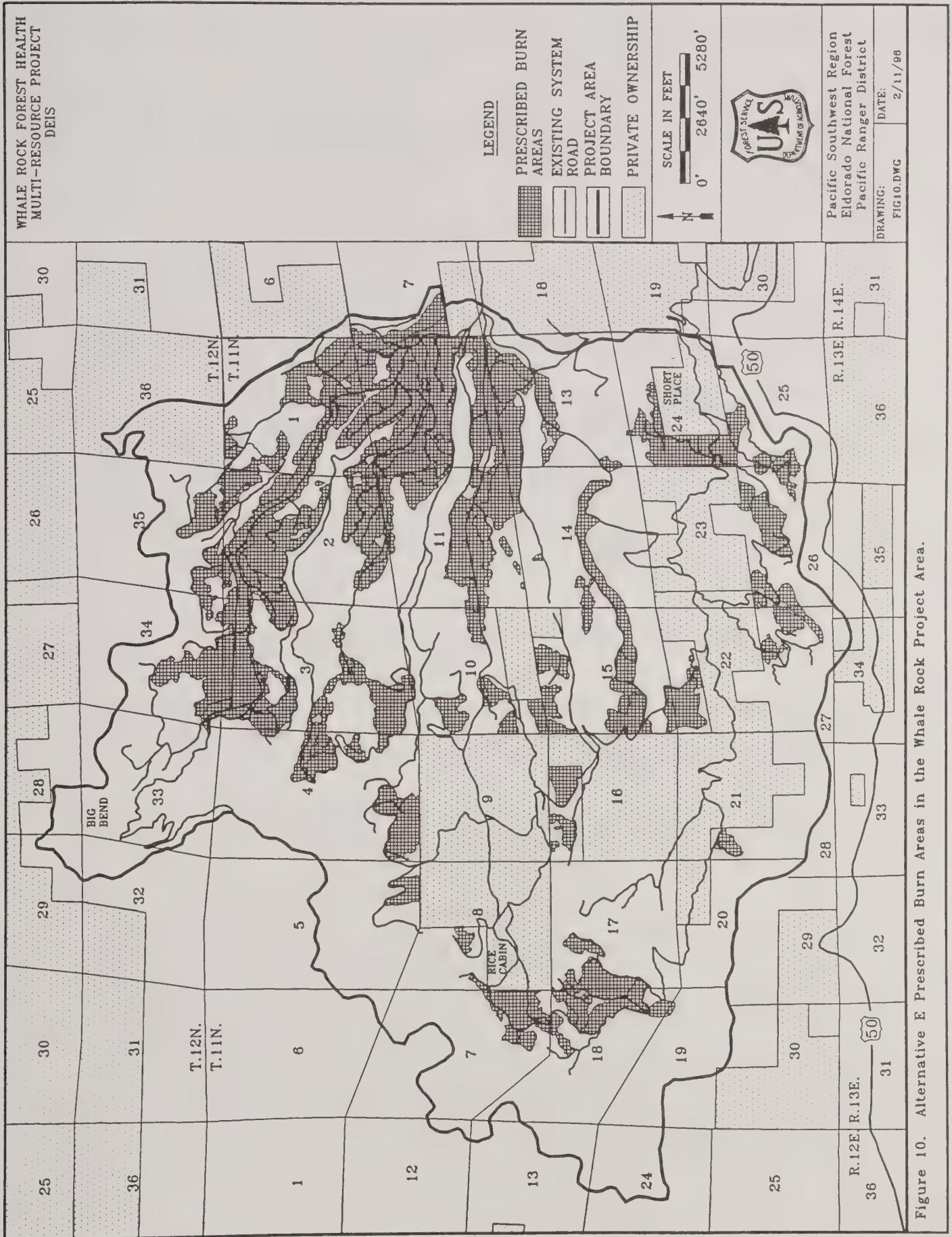
The natural stands and plantations selected for entry are those that are capable of supporting commercial sawtimber or biomass operations. Total areas harvested, including fuelbreaks, plantations and natural stands, will be 3,679 acres. Harvest will initiate the commercial thinning of 1,124 MBF from 562 acres of existing 34-year-old plantations and 12,233 MBF from 2,203 acres of overstocked natural stands. Total quantities of sawtimber and biomass to be removed are estimated at 19,492 MBF and 49,565 tons, respectively. No harvest activities would occur in PACs.

All the shaded fuelbreaks described in Alternative B would be constructed (14.5 miles, with 6,135 MBF taken from 914 acres). Of the 14.5 miles, approximately 11.0 miles would actually be harvested under this alternative. The remaining 3.5 miles consist of lava caps and young plantations that would not be harvested. Activities within these 3.5 miles would occur as post-sale burning or brush control. Shaded fuelbreaks would retain trees of various species and sizes, with the intent to have tree spacing approaching 20 feet between crowns to reduce the risk of large stand-replacing wildfires. The number of trees retained on a per-acre basis would vary depending on crown diameters of the trees left standing. Where available, a minimum of 50 square feet basal area would be retained in ponderosa









pine. The fuelbreaks would be used as a frontline defense for wildfire fighting purposes and as anchors in the post-sale prescribed burning program.

In the short-term, shaded fuelbreaks would need to be maintained by removing dead trees when those numbers exceed the minimum outlined in LRMP guidelines, and by treating low-growing vegetation mechanically or by prescribed burning to prevent the redevelopment of fuel ladders and unacceptable fuel loadings. Over time, the shaded fuelbreaks would become less important as the entire Whale Rock area becomes more resilient to catastrophic fires because of landscape-level changes in fuel loads. It is expected that these fuelbreaks would be managed at lower stocking levels for roughly 25 years or until the general project area reaches an acceptable, overall fuel loading level. When desired levels of fuel loading are achieved, the shaded fuelbreaks would then be blended back into the adjacent timber stands by allowing some increase in stocking levels.

Some plantations and natural stands that cannot currently support commercial operations would be prescribed burned as a post-sale activity. Fuels treatments would occur on a total of 4,510 acres, including light understory burning on 590 acres in non-harvested portions of selected PACs. Prescribed burning would occur on a total of 2,902 post-harvest acres and on 831 non-harvested acres. Machine piling, with subsequent burning of the piles, would occur on 777 acres. Approximately 644 acres would be prescribed burned annually during a 7 year burn cycle.

Approximately 2.2 miles of new road construction and 32.1 miles of road reconstruction would be necessary to implement this alternative. This road work would cost an estimated \$975,785.

The cost of implementing Alternative E is 2.9 million dollars. Stumpage collected under this alternative is estimated at 4.6 million dollars. An estimated 250 full time, year-round jobs would be created or maintained.

The expected results of implementing Alternative E include meeting combined wildlife, fire and timber objectives by combining management activities proposed in Alternatives B through D. Results include the reduction of fuels accumulated on the ground and present as fuel ladders. Prescribed burning would favor ponderosa pine establishment and growth, rather than fir or cedar, due to ponderosa pine's adaptation to fire. The fairly extensive prescribed burning proposed for this alternative would aid in the regeneration of brush seedlings and oaks. In the areas burned, large snags and down logs would likely decrease due to fire consumption during prescribed burning. Wildlife habitat would be improved through fuels reduction and thinning. Those forested stands that have a dense understory and heavy fuel accumulations would become more open following treatment. Treated stands would become more resilient to fire, disease and insect infestation through the removal of dense, competing, young-growth trees, and would achieve a greater percentage of large trees in a shorter time frame than in Alternatives C or F, but a somewhat smaller percentage than in Alternative B.



## RESPONSE OF THE ALTERNATIVES TO THE IDENTIFIED ISSUES

The alternatives described above respond in varying ways to the issues identified for the Whale Rock Project. The following section outlines how effectively each alternative addresses the issues identified for the Whale Rock area.

### ALTERNATIVE A

**1. Reduce the risk of stand-replacing fires --** No activities would be undertaken in this alternative to reduce fire hazards, and 97% of the project area would remain in high fire hazard conditions. Fuel loads would continue to increase. Because of the high fuel loading and areas of steep terrain, a high intensity, extensive wildfire is highly likely in this area sometime in the future (more than one third of the area has experienced stand-replacing fires in the last 36 years). Fires occurring in the area will continue to be suppressed, with the goal of containing them at less than 10 acres in size. This goal will become increasingly difficult to meet due to the accumulation of fuel, which adds to the resistance to control, increased rate of spread, and potential for crown fires. If the fire history experienced during the last 18 years continues, an increase of 400% in fire starts by people can be expected. With the increase in fuel loads, the largest probable catastrophic fire in the area can be expected to consume essentially the entire project area, or roughly 17,885 acres.

**2. Minimize cumulative effects to natural resources --** Alternative A would create no increase or decrease in ongoing erosion within the project area; soil displacement and soil compaction would not directly increase under this alternative; and no changes to soil cover and nutrient cycling would occur. However, since the area will remain at high risk of a large catastrophic fire, there will exist a high potential for eventual loss of soil cover, organic matter and downed logs, which could lead to reduced nutrient levels in soils, decreased water-holding capacities, loss of vegetative cover, accelerated erosion rates, increased runoff rates, loss in soil, decreased soil productivity and increased sedimentation into downstream rivers and reservoirs.

The absence of project disturbance under Alternative A would permit the current trend of recovery from past management practices to continue for all watersheds. Within 4 years, all watersheds would have recovered to the point where no watershed would exceed its threshold of concern (TOC). However, a catastrophic fire in this area would have major consequences to both the watershed and downstream beneficial uses. Increased sedimentation, debris jams, channel scouring, culvert failure, road washouts, increased water temperatures and landslides might be expected. Downstream beneficial uses of water (reservoir storage, hydroelectric power generation, fisheries) would also be negatively affected. In the worst-case scenario, a wildfire burning at high intensities within one or more of the watersheds in the project area could result in the modeled ERA for the watershed exceeding the TOC by 200% or more.



Most of the forested stands in the area are in the mid-seral state with a dense understory of pole size trees. The dense understory impedes movement of both early seral wildlife species, such as deer, and late seral species, such as northern goshawks and spotted owls. Brushfields that occur throughout the area will continue to degrade, providing low quality forage for wintering deer. Black oak regeneration will tend to diminish as the duff depth increases and conifer stands continue to achieve increased crown closure and site dominance. Habitat capabilities for fish and wildlife will gradually degrade to lower levels for all but late seral species. The continued heavy accumulation of fuel could lead to a large scale, catastrophic fire which would destroy habitat and displace individuals to other areas, increasing competition within or between species. Twenty-one percent of the total Pacific Deer Herd critical winter range would be destroyed if the project area burned (13% was destroyed by the 1992 Cleveland Fire). There is a potential for the loss of habitat through fire for 7 pairs of spotted owls in the Whale Rock area.

**3. Reduce the risk of fire from and to private residences --** Since no activities would be undertaken in this alternative to reduce fire or safety hazards, the risk of fire from and to residential development within Whale Rock would remain high. Fire suppression practices would continue when wildfires occur for protection of resources, improvements and public safety. However, the goal of containing fires to less than 10 acres in size will become increasingly difficult to meet.

**4. Balance the wildlife need for snags with the public/forest worker risks from snags --** No activities would be undertaken in this alternative to reduce the safety hazards from snags within the project area. The recruitment rate of snags would continue to be dependent upon the interplay of precipitation levels, stand density and other natural elements, such as the incidence of insect attack or amounts of windthrow. The existing snag and down log numbers, higher than what is considered to be the natural range of variability, contribute to increased fuel loadings and wildfire risk. A catastrophic fire would create tremendous additional numbers of new snags while consuming existing snags and down logs. The probability of this occurring is greater in the long term than in the short term.

**5. Maintain rural economic vitality --** This alternative would generate no receipts to the federal treasury or to the local counties from the sale of forest products. Opportunities for direct employment in the harvest and sawmill operations would not occur. Income taxes generated by wages from employment, and sales and property taxes associated with harvest and manufacturing, would not be realized. The reduction in county receipts from the 25% Receipts Fund Act would result in reduced local community benefits which would subsequently affect the quality of education and standard of county road maintenance. Reduced county income might therefore necessitate an increase in local taxes or changes in local budget priorities. If the project area were consumed in a fire, total suppression costs would equal \$18,000,000. Loss of future timber value in a fire equates to a potential cost of an additional \$180,000,000 under this alternative.

**6. Maintain or enhance late seral (old growth) habitat conditions --** The overstocked stands common in the area will be slow to mature to late seral stages. It is assumed that

with no harvests or fires, the amount of 4N,G strata would increase from 1,995 acres (14.1%) to approximately 8,832 acres (61%) within 50 years. All of the size class 2 strata will have become at least size class 3 strata, while some will have become size class 4 strata. All of the existing young plantations will have become size class 3 strata. However, if a wildfire occurred, the vegetation strata shift would be toward an early seral state in the areas intensively burned. Under a No Action Alternative, fire modeling reveals that a potential catastrophic fire could burn the entire project area, with nearly 100% of the area converted to early seral strata consisting of brushfields.

**7. Maintain or enhance early seral habitat conditions --** With no action, over 60% of the project area would be in a late-seral condition in 50 years. These conditions would dominate and fragmentation would be associated primarily with the early and mid-seral types. Early seral conditions would only be associated with some low-productive sites and areas of intense disturbance, such as fires. Brushfields still existing in the area would be overmature and decadent with little regeneration. These would be of little use to early seral dependent species such as deer.

**8. Maintain or enhance sensitive plant habitat --** The structure and function of sensitive plant communities would be unaltered, except by the process of plant succession. Some habitat would be lost due to the continued encroachment of brush. The action of fire periodically removing shrubs and young trees improves the habitat for most herbaceous plant species, including 3 sensitive plant species that occur in activity areas in Alternative A. By not treating the existing fuel load in the forest, the risk of a large stand-replacing wildfire increases. A stand-replacing fire would tend to improve and temporarily enlarge the habitat for the 3 sensitive plant species. Although the occurrence of a large wildfire would initially bring some beneficial effects to sensitive plants, adverse effects might be expected as well. After a large fire and subsequent vigorous shrub regrowth, the habitat will eventually be reclaimed by species other than sensitive plants.

**9. Maintain economic practicality --** Implementing the No Action Alternative would prevent any further public funds from being spent for the planning or execution of this project. The estimated \$144,000 already spent for planning would be a sunk cost.

**10. Maintain air quality --** There will be no increase in PM 10 (particulate matter 10 microns or larger in size) under this alternative. No increase from fugitive dust or equipment emissions will occur. However, if the fire history experienced during the last 18 years continues, an increase of 400% in fire starts by people can be expected. With the increase in fuel loads, fires can be expected to be larger, with air quality continuing to degrade. If the entire project area burned from wildfire, the following emissions would be produced during an estimated time of 1 to 3 weeks: PM 10 – 13,931 tons; carbon monoxide – 105,555 tons; methane – 4,311 tons; and non-methane emissions – 3,357 tons. During the flaming phase of catastrophic wildfire, air quality degradation could exceed Federal and State standards for as far as 50 miles downwind of the event. During the smoldering phase, degradation of air quality could extend to 10 miles downwind. At night, with the diurnal wind change, air quality could be affected for 30 miles down canyon as the night inversion traps the smoke below it.



**11. Maintain or enhance the unique features of the lava caps --** Between fires, the diverse plant assemblages of the lava cap would continue to be overtaken by shrubs, stunted trees, and exotic weed species. No activities would be undertaken to maintain or enhance the lava cap plant communities.

**12. Avoid impacts to cultural (heritage) resources --** No impacts from project activities will occur to cultural resource sites as a result of implementing this alternative. However, few mechanisms will exist to address or mitigate damage which has occurred from prior activities or continues from current activities, such as recreational use.

**13. Maintain the scenic quality along the Highway 50 corridor and the South Fork of the American River --** Alternative A would have no direct effect on the visual resources as observed from the affected viewsheds of Highway 50 and the South Fork of the American River. Any reduction or enhancement to the existing scenic quality from proposed project activities would not occur. Existing visual conditions of altered areas will continue to improve as the trees grow in the plantations and in other previously harvested areas and they become less noticeable and more natural appearing.

## ALTERNATIVE B

**1. Reduce the risk of stand-replacing fires --** A total of 6,303 acres would be subject to fuels treatment. Prescribed burning would occur on 3,633 acres after harvest activities, with another 1,646 non-harvested acres broadcast burned, including 590 acres within PACs. This acreage represents 44% of the total project area and is located on strategic ridgetops and southern exposures, areas critical to future prescribed burns and wildfire suppression actions. Approximately 14.5 miles of constructed, shaded fuelbreaks are included in this alternative. Slash generated by harvest operations will be disposed of by purchaser treatment and prescribed burning. Approximately 67,169 tons of biomass will be removed from the harvest areas; this is a major reduction in fuel loading. If this biomass were to burn in a wildfire, it would be equivalent to the smoke and energy released from all the woodstoves and fireplaces in the Pollock Pines area for a period of approximately 9 years. There is a 10,600 acre reduction in predicted fire size compared to Alternative A. Since fuels treatment effectively reduces the size of a potential catastrophic fire to about 7,400 acres, it is more likely that all stands within the project area can be perpetuated without loss to wildfire.

**2. Minimize cumulative effects to natural resources --** Watershed cumulative effects are second highest under this alternative. Four of seven watersheds would be over the TOC for a period of 2 to 10 years. Effects to water yield and water quality can be expected as a direct effect of timber harvest and post-sale treatment. Some increased sedimentation resulting from changes in infiltration rates caused by compaction, direct soil displacement or the reduction in the amounts of ground cover can also be expected. The application of appropriate BMPs should reduce nonpoint sources of pollution from sediments to levels compatible with water quality goals. Proposed new road construction consists of 1.7 miles



spread over 4 watersheds. Impacts from these roads will be minor since they will be primarily located on ridgetops and upland slopes, and not affecting any Class I or II streams. Road reconstruction will improve the control of road surface runoff and correct some of the current sedimentation problems in the existing road system. All main skid roads will be subsoiled after use, providing further beneficial effects to infiltration rates, since many of these are currently compacted. If this area is protected from a catastrophic fire, long term watershed conditions would be considerably better.

The adverse effects to the soil resource in this alternative are projected to be very small. The LRMP standards and guidelines, Draft Region 5 Soil Quality Standards, and BMPs will be followed to minimize impacts. The use of existing skid trails and landings will be emphasized to minimize loss of soil porosity, compaction, displacement, and loss of ground cover. Skid roads and landings will be subsoiled after use and ground cover spread over selected bare surfaces (grass-seeding and/or mulching). Operations will be limited during periods of wet weather. Understory burning will have little or no direct impact to the soil resource, except in small areas where 'hot spots' may reduce ground cover below acceptable standards; these areas can be seeded and/or mulched if needle cast or resprouting vegetation (such as bear clover) is insufficient. One beneficial effect of Alternative B will be to greatly reduce the risk of catastrophic wildfire. If a catastrophic wildfire were to occur, it would be likely to cause the greatest adverse effects to the soil resource, including increased erosion rates and loss of long term soil productivity.

The reduction in existing vegetation through harvesting will result in a higher level of soil moisture available to vegetation. Higher levels of water availability would reduce the rate of occurrence of drought-related mortality. Riparian vegetation would benefit because moisture levels associated with streams, springs and seeps would increase and be available longer into the year. By reducing the risk of fire within the stands occupied by rust resistant sugar pine, the perpetuation of their unique genotype is more readily assured. Major oak woodland stands are not being entered for harvest and will be protected. The return of a fire regime and stand conditions that mimic those of the pre-European era will return black oak to the extent that it previously held. Reducing the competition from shade tolerant conifers through burning will improve the competitive position of black oak. The more open conditions will favor the black oak trees and this will be evidenced by reduced mortality, increased crown spread and increased acorn production. Over time, black oak will become a larger component of the timber stands. These benefits are highest in Alternative B.

Prescribed burning, harvest activities and road construction will result in direct disturbance to some individuals of wildlife species present in the project area. These effects will be minimal and will be controlled by project design, such as limited operating periods and road closures. The extensive thinning and prescribed burn program proposed by Alternative B will improve habitat in the Whale Rock area for most wildlife species. Late seral species, such as spotted owl, goshawk and fishers, will benefit from the future increase in available suitable habitat brought about by thinning and prescribed burning, which allow stands to reach a late seral age at an increased rate. Early seral species, such as deer, will benefit from small, dispersed openings created in the canopy, and from

grasses and forbs that will invade understory released from heavy slash and duff accumulations. Deer will also benefit from better quality forage through the regeneration of brushfields and oak stands. Prescribed burning of the area, along with the fuelbreak system, will reduce the risk of catastrophic fire. This will protect and improve habitat for all wildlife species in the area. Prescribed burning of nearly 600 acres of PACs will provide substantial protection to these Spotted Owl areas. However, burning within the PACs without a pre-burn harvest entry is a concern in this alternative, as additional burn entries would be needed to remove the fuels present in the PACs. The extensive presence of ladder fuels in the PACs continues to remain a risk to the PACs from potential fires.

**3. Reduce the risk of fire from and to private residences --** The proposed activities in this alternative are sufficiently large as to reduce the likelihood that a high intensity wildfire would destroy the harvested stands or adjacent stands. Since the probability of a large fire is reduced in this alternative, the risk to and from private residences is also reduced. Due to the location of project activities, private residences would have increased protection from wildland fires originating above and to the north of their location. Protection from fires starting in the canyon below or to the south of the residences would remain the same. Increased protection of public lands from fires originating from within the developed areas would be realized to the north and upslope of the developments, while areas downslope and to the south would remain unchanged.

**4. Balance the wildlife need for snags with the public/forest worker risks from snags --** The retention of large trees under CASPO prescriptions would provide potential large future snags for wildlife needs. Snag levels on north slopes and in PACs should remain unaffected as minimal activities are planned in these areas. Cavity nesting bird densities would be near maximum because 8 snags per acre (5 greater than the 3 snags per acre standard) will be maintained over the project area. However, prescribed burning over consecutive years may decrease snags and downed woody material on the forest floor. This may affect species that depend on those materials, such as spotted owls. In addition, some snags will also be created by the burning. Snag levels will be monitored, and if they should fall below desired levels, snag recruitment will be used to replace incidental losses. Overall, Alternative B will have a positive cumulative effect on wildlife habitat by substantially reducing the possible loss of habitat due to a stand-replacing wildfire.

For safety reasons, this alternative calls for the falling of an estimated maximum of 4500 snags adjacent to 30 miles of haul roads since they present a hazard to traffic on the roads. An average of an additional snag per acre (4,000 total) within harvest areas would be felled and removed to meet fuel and safety concerns. The falling of a total of 8,500 snags would represent a reduction of an estimated 8.0% of the snags within the project area. After harvest, snags within harvest areas would average 8 per acre with a basal area of approximately 15.2 ft<sup>2</sup>/acre (1.9 ft<sup>2</sup>/tree). Snags outside of harvest areas and away from roads would not be treated.

**5. Maintain rural economic vitality --** Alternative B would cost \$3,361,922 to implement, but more than \$5,200,000 would be directly returned to the public through



timber receipts. Approximately \$1,300,000 would be returned to local counties for roads and schools. An estimated 180 full-time, year-round jobs would result from this alternative. The sale of 22,400 MBF of timber represents about 16% of one year's mill capacity for the largest mill in the county and about 50% mill capacity for one of the smaller mills in the county. In addition, by reducing the incidence of wildfire, it is expected that over \$10,000,000 would be saved from reduced future fire fighting and in excess of \$106,000,000 in future timber losses could be avoided.

**6. Maintain or enhance late seral (old growth) habitat conditions --** Thinning large areas will open the forest up, and allow those trees that are left standing to reach late seral forest conditions at a quicker rate than if no harvesting were to take place. An estimated 261 acres of 4N,G stands will be harvested under this alternative. The retention of at least 40% crown closure will assure that these stands retain their late seral attributes of size and crown closure. It is estimated that with harvests, but no wildfires, the amount of 4N,G strata would increase from 1,995 acres (13.8% of project area) to 9,450 acres (67% of project area) within 50 years, thus reducing the amount of fragmentation currently present in the project area. All of the size class 2 strata will have become at least size class 3 strata and some of the size class 2 strata will have become size class 4 strata. All of the existing young plantations will have become size class 3 strata. It would be expected that the only locations where size class 2 strata would occur are on those lands where conifers do not dominate, such as the lands dominated by black or canyon oak, and brushfields through which conifers are emerging.

**7. Maintain or enhance early seral habitat conditions --** With 67% of the project area in a late seral condition in 50 years, late seral forests would tend to be the dominant habitat type and fragmentation would be associated with the early and mid-seral types. Without natural disturbance occurring, additional activities (thinning, burning, etc.) would need to be implemented in the project area in the future to maintain early seral habitat conditions. The prescribed burning of decadent brushfields proposed in this alternative will regenerate those areas and provide better quality forage to the Pacific deer herd.

**8. Maintain or enhance sensitive plant habitat --** Activities proposed in Alternative B are expected to be mostly beneficial to sensitive plant habitat. Eleven known occurrences of sensitive plants are within proposed harvest units. These will be protected through flag-and-avoid measures. Lava caps, on which two sensitive species are found, will be incorporated into proposed fuelbreaks. Understory burning in sensitive plant habitat and near occurrences may contribute to an increase in plant numbers through reduction of competition and ground cover. Exposure of mineral soils may also increase the germination and establishment rate for sensitive plants. Corridors for potential exchange of genetic material will be created through burning, thinning and biomassing. Sale Area Improvement funds would be collected to control the spread of exotic plant species which are presently becoming established in the project area, and that may pose a threat to sensitive plants and their habitat.

**9. Maintain economic practicality --** Harvest activities would include the commercial thinning of 1,124 MBF on 562 acres of plantations and 21,302 MBF on 4,095 acres of



natural stands. Total quantities of sawtimber and biomass to be removed are estimated at 22,426 MBF and 67,169 tons, respectively. The total cost of proceeding with this alternative is estimated to be \$3,361,922. Total receipts to the treasury are expected to approach \$3,900,000, while receipts to the county would be an additional \$1,300,000. An estimated 180 full-time, year-round jobs would result from this alternative. This alternative funds prescribed burning operations through dollars collected from timber receipts, thus consistent funding of the prescribed burning program is reasonably assured for the next 5 to 10 years.

**10. Maintain air quality --** Prescribed burning in Alternative B will reduce the fire hazard on approximately 900 acres annually for the first 7 years, and would average 377 tons of PM 10 per year during the 50 days of burning per year. During the flaming phase of prescribed burning, air quality degradation could exceed Federal and State standards for as far as 3 miles downwind of the event. During the smoldering phase, air quality degradation would only be affected at and adjacent to the site. At night, with the diurnal wind change, air quality would be affected for 15 miles down canyon from the source as the night inversion traps the smoke below it. An increase in fugitive dust and equipment emissions will occur; however, the effects will be mitigated with dust abatement. If Alternative B is implemented, the largest probable catastrophic wildfire would be around 7,400 acres, with emissions of 5,790 tons of PM 10 spread over a 10 day period.

**11. Maintain or enhance the unique features of the lava caps --** The lava cap plant communities will generally resemble their current condition, with shrubs becoming less conspicuous. Small trees invading the lava caps will be fewer in number due to prescribed burning. Some prescribed burn brush mortality would occur. On those lava caps where the brush is beginning to dominate the plant community, fire-induced mortality would be most obvious.

**12. Avoid impacts to cultural (heritage) resources --** All activities will comply with the National Historic Preservation Act and its implementing regulations (36 CFR 800). Compliance will be directed by the stipulations in the Memorandum of Understanding between the Eldorado National Forest and the California State Historic Preservation Officer (SHPO), and all Programmatic Agreements in place between the SHPO and the Eldorado National Forest. Cultural resource sites will be identified on the ground and protected during project activities by contract provision. Sites will be monitored if project activities occur within 50 meters of their boundary.

**13. Maintain the scenic quality along the Highway 50 corridor and the South Fork of the American River --** The thinning of even-aged plantations within the viewshed areas will tend to break up the uniform green color and textured look that exists with the plantations, giving them the appearance of a more open forest. Individual trees, patches of brush, open grassy areas and stands of older trees will become more noticeable, thus adding to the variety of the viewed landscape. Changes in form, line, color and texture will eventually achieve the desired visual condition of a more open and natural appearing landscape, which will enhance the views as seen from Highway 50 and the South Fork of the American River.

## ALTERNATIVE C

**1. Reduce the risk of stand-replacing fires --** Fuels treatment will occur on 5,623 acres, including understory burning on 493 acres within PACs (only 141 acres of which would be thinned prior to burning). This represents fuels reduction on 39% of the total Forest Service ownership within the project area, and would result in the largest probable catastrophic wildfire being 7,870 acres (6% larger than indicated in Alternative B). Understory burning would occur on 2,086 harvested acres, 3,075 non-harvested acres, and 462 machine-piled acres. Since the areas selected for treatment under this alternative emphasize wildlife habitat improvement, rather than fuels reduction, the likelihood of being able to successfully burn over 3,000 acres without a pre-burn harvest entry remains a concern for this alternative, as additional burn entries would be needed to successfully remove the fuels. In addition, ladder fuels will be present on all areas not harvested, which merely adds to the complexity of the prescribed burning in Alternative C.

**2. Minimize cumulative effects to natural resources --** Since the areas selected for treatment under this alternative emphasized wildlife habitat improvement, the benefits for wildlife are somewhat greater than in Alternative B. Wildlife habitat will be protected and enhanced through project activities including thinning, biomass removal and prescribed burning in plantations and natural stands. The harvest operations in the PACs would focus on removing ladder fuels by thinning overgrown thickets that are contained within the PAC boundaries. The thinning and subsequent understory burning would reduce the risk of a stand-replacing fire destroying the PAC. Although project activities will result in the direct disturbance to some individuals of wildlife species present in the project area, these will be minimal and will be controlled by project design (such as limited operating periods and road closures). The risk of disturbance is less in Alternative C than in Alternative B, as just over half the acres proposed in B will be harvested in this alternative. However, burning 3,000 acres without a pre-burn harvest entry remains a concern.

Late seral species, such as spotted owl, goshawk and fishers, will benefit from the future increase in available suitable habitat brought about by thinning and prescribed burning which allow stands to reach a late seral stage at an increased rate. Early seral species, such as deer, will benefit from small, dispersed openings created in the canopy, and from grasses and forbs that will invade understory released from heavy slash and duff accumulations. Deer will also benefit from better quality forage through the regeneration of brushfields and oak stands. Prescribed burning will reduce the risk of catastrophic fire. This will protect and improve habitat for all wildlife species in the area, including spotted owls.

Although this alternative addresses impacts to soils in the same way as Alternative B, there are somewhat fewer effects in Alternative C than in Alternative B due to the reduced number of acres harvested (2,109 acres less), the reduced number of acres prescribed burned (680 acres less), and the reduced construction of new roads (0.7 miles less). The effects will be mitigated in the same way as in Alternative B (i.e., following the LRMP standards and guidelines, Draft Region 5 Soil Quality Standards, and BMPs; emphasizing the use of existing skid trails and landings, with skid trails and landings subsoiled after use



and ground cover spread over selected bare surfaces; limiting operations during periods of wet weather; and seeding and mulching understory burning areas where 'hot spots' may reduce ground cover below acceptable standards). One beneficial effect of Alternative C will be to reduce the risk of catastrophic wildfire, although this potential benefit is less effectively addressed in this alternative than in Alternative B. If a catastrophic wildfire were to occur, it would be likely to cause the greatest adverse effects to the soil resource, including increased erosion rates and loss of long term soil productivity.

Because of the reduced harvest acreage, the adverse effects of this alternative to watersheds are reduced compared to Alternative B, although four watersheds would still exceed their TOC. The recovery time for all watersheds would generally be shorter under this alternative than Alternative B. Similar effects to water yield and water quality can be expected as a result of timber harvest and post-sale treatment. Some increased sedimentation resulting from changes in infiltration rates caused by compaction, direct soil displacement or the reduction in the amounts of ground cover can also be expected. The application of appropriate BMPs should reduce nonpoint sources of pollution from sediments to levels compatible with water quality goals. Proposed new road construction consists of 1.0 miles spread over 4 watersheds. Impacts from road building will be minor, since construction will mainly take place on ridgetops and upland slopes, not affecting any Class I or II streams. Road reconstruction will improve the control of road surface runoff and correct some sedimentation problems with the existing road system. All main skid roads will be subsoiled after use, providing further beneficial effects to infiltration rates, since many of these are currently compacted.

As in the other alternatives, if this area is protected from a catastrophic fire, long term watershed condition will be considerably better than would occur if the area burned. Under catastrophic fire conditions, the projected ERAs more than double those projected with management activities.

The reduction in existing vegetation through harvesting will result in a higher level of soil moisture available to vegetation, which should reduce the rate of occurrence of drought-related mortality. Riparian vegetation will benefit because moisture levels associated with streams, springs and seeps will increase and be available longer into the year. By reducing the risk of fire within the stands occupied by rust resistant sugar pine, the perpetuation of their unique genotype is more readily assured. Major oak woodland stands will be protected, as they will not be harvested. Light understory burning will return black oak to the extent that it previously held by reducing the competition from shade tolerant conifers. Over time, black oak will become a larger component of timber stands. These benefits are less widespread in this alternative than in Alternatives B or E, but greater than in A or D.

**3. Reduce the risk of fire from and to private residences --** Since the probability of a large fire is reduced in this alternative, the risk to and from private residences is also somewhat reduced. This benefit is offset somewhat by the difficulties involved in prescribed burning over 3,000 acres without a pre-burn biomass harvest entry to reduce the ladder fuels prior to burning. Due to the location of project activities, private

residences would have increased protection from wildland fires originating above and to the north of their location. Protection from fires starting in the canyon below or to the south of the residences would remain the same. Increased protection of public lands from fires originating from within the developed areas would be realized to the north and upslope of the developments, while areas downslope and to the south would remain unchanged.

**4. Balance the wildlife need for snags with the public/forest worker risks from snags --** The felling of 3,300 hazardous trees along 22 miles of roads (12 miles less than in Alternative B) will make fire suppression and burning operations safer when these roads are used for fire lines. Fewer hazard trees would be felled in the general forest zone than in Alternative B (596 hazard trees in C, compared to 3,260 in B), thus perpetuating the risk of injuries or fatalities to firefighters. No shaded fuelbreaks would be constructed, resulting in more difficulty in stopping and controlling fires in the project area.

An average of an additional 0.3 snags per acre (roughly 596 total; 3,404 less than in B) within the harvest area would be felled and removed to meet fuel and safety concerns. The falling of a total of 3,900 snags would represent a reduction of an estimated 3.4% of the snags within the project area (8,500 snags would be taken in Alternative B for a reduction in 8% of the snags in the project area). After harvest, snags would average approximately 8.0 per acre, with a basal area of approximately 15.2 ft<sup>2</sup>/acre (1.9 ft<sup>2</sup>/tree). Snags outside of harvest areas and away from roads will not be removed.

The retention of large trees in harvest areas under CASPO prescriptions would provide potential large future snags. Snag levels on the majority of the Whale Rock area will remain unaffected, as no activities are planned over most of the area. Cavity nesting bird densities would be near maximum because 8 snags per acre (5 greater than the 3 snag per acre standard) will be maintained over the project area. Although some snags will be created by burning, prescribed burning over consecutive years might decrease snags and downed woody material on the forest floor. This may affect species that depend on those materials, such as spotted owls. Snag levels will be monitored, and if they should fall below desired levels, snag recruitment will be used to replace incidental losses.

**5. Maintain rural economic vitality --** The total cost of proceeding with this alternative is estimated to be \$2,471,704. Total receipts to the treasury are expected to approach \$2,292,000, while receipts to the county would be an additional \$763,875. An estimated 101 full-time, year-round jobs would result from this alternative. The sale of 12,964 MBF of timber represents about 9% of one year's mill capacity for the largest mill in the county and about 27% mill capacity for the smaller mill in the county.

The reduction in the costs of fire suppression associated with the proposed fuels reduction on 5,623 acres is substantial. Because of the fuels treatment, it is expected that the largest catastrophic wildfire would not exceed 7,870 acres. This is a 10,068 acre reduction in potential catastrophic burn acreage when compared to the No Action Alternative. At a suppression cost of \$1,000/acre, a potential savings of nearly \$10,068,000 in future fire fighting costs is embodied in this alternative. In addition, the reduction in fire size would



offer substantial savings to the timber resource within the project area. With an estimated reduction in the loss of future timber values of \$10,000 per acre, there would be a total savings of about \$100,680,000 to the timber resource.

**6. Maintain or enhance late seral (old growth) habitat conditions --** Thinning large areas will open the forest up, allowing those trees that are left standing to reach late seral forest conditions at a faster rate than if no harvesting were to take place. An estimated 276 acres of 4N,G stands will be harvested in Alternative C, including 141 acres located within PACs (no harvesting occurs in PACs in Alternative B). Stands will retain their late seral attributes and will not be further fragmented, because all 276 acres of 4N,G stands proposed for harvest will retain the large tree element and at least 40% crown closure. Changes in vegetation strata class 3 will result due to harvest, with 1,070 acres converted from class 3 to size class 4 (886 acres less than in Alternative B).

As in Alternative B, it is estimated that with harvests, but no wildfires, the amount of 4N,G strata will increase from 1,995 acres (13.8% of project area) to 9,450 acres (67% of project area) within 50 years, thus reducing the amount of fragmentation currently present in the project area. All of the size class 2 strata will have become at least size class 3 strata, and some of the size class 2 strata will have become size class 4 strata. All of the existing young plantations will have become size class 3 strata. It is expected that the only locations where size class 2 strata will occur are on those lands where conifers do not dominate, such as lands dominated by black or canyon oak, and brushfields through which conifers are emerging.

**7. Maintain or enhance early seral habitat conditions --** With 67% of the project area in a late seral condition in 50 years, late seral forests would tend to be the dominant habitat type and fragmentation would be associated with the early and mid-seral types. Without natural disturbance occurring, additional activities (thinning, burning, etc.) would need to be implemented in the project area in the future to maintain early seral habitat conditions. The prescribed burning of decadent brushfields proposed in this alternative will regenerate those areas and provide better quality forage to the Pacific deer herd.

**8. Maintain or enhance sensitive plant habitat --** Risks of mechanical damage to individual plants are reduced because only 4 sensitive plant occurrences are in or adjacent to proposed harvest units in Alternative C (B has 11). These will be protected through flag-and-avoid measures. Understory burning in sensitive plant habitat and near occurrences may contribute to an increase in plant numbers through reduction of competition and ground cover. Exposure of mineral soils may also increase the germination and establishment rate for sensitive plants. Corridors for potential exchange of genetic material will be created through burning, thinning and biomassing. Although Sale Area Improvement funds would be collected to control the spread of exotic plant species in the project area, less of these monies would be available in this alternative than in Alternative B or E, as less stumpage is generated.

**9. Maintain economic practicality --** Implementing Alternative C would sanction the continued expenditure of funds for the preparation, administration and maintenance of

forest health activities. The total cost of proceeding with this alternative is estimated to be \$2,471,704. Total receipts to the treasury are expected to approach \$2,292,000, while receipts to the county would be an additional \$763,875. This alternative funds prescribed burning operations through timber receipts, thus consistent funding of the prescribed burning program is reasonably assured for the next 5 to 10 years.

**10. Maintain air quality --** Although almost 700 fewer acres would be prescribed burned under this alternative than Alternative B, the fact that most of the prescribed burning occurs without a biomass harvest actually increases the adverse effects upon air quality per acre burned. The net effect is that this alternative has about the same effect upon air quality as Alternative B. Alternative C proposes prescribed burning that will result in emissions of approximately 2,200 tons of PM 10 (17% less than Alternative B) spread over a total of 350 days during a 7 year period. The burning will reduce the fire hazard on approximately 800 acres annually for the first 7 years, and will average 314 tons of PM 10 per year during the 50 days of burning per year.

Approximately 31,895 tons of biomass will be removed from the harvest areas. If this fuel were to burn in a wildfire, it would be equivalent to the smoke and energy released in all the woodstoves and fireplaces in the Pollock Pines area for the next 4 years and 3 months. With treatment, the largest probable catastrophic wildfire would be approximately 7,870 acres. Emissions from this would be 6,218 tons of PM 10 which would likely be spread over a 10 day period; this is 7% more PM 10 than would occur from a potential large wildfire under Alternative B.

**11. Maintain or enhance the unique features of the lava caps --** The lava cap plant communities will generally resemble their current condition, with shrubs becoming less conspicuous. Small trees invading the lava caps will be fewer in number due to prescribed burning. Some prescribed burn brush mortality would occur. On those lava caps where brush is beginning to dominate the plant community, fire-induced mortality would be most obvious.

**12. Avoid impacts to cultural (heritage) resources --** All activities will comply with the National Historic Preservation Act and its implementing regulations (36 CFR 800). Compliance will be directed by the stipulations in the Memorandum of Understanding between the Eldorado National Forest and the California State Historic Preservation Officer (SHPO), and all Programmatic Agreements in place between the SHPO and the Eldorado National Forest. Cultural resource sites will be identified on the ground and protected during project activities by contract provision. Sites will be monitored if project activities occur within 50 meters of their boundary.

**13. Maintain the scenic quality along the Highway 50 corridor and the South Fork of the American River --** The thinning of even-aged plantations within the viewshed areas will tend to break up the uniform green color and textured look that exists with the plantations, giving them the appearance of a more open forest. Individual trees, patches of brush, open grassy areas and stands of older trees will become more noticeable, thus adding to the variety of the viewed landscape. Changes in form, line, color and texture will



eventually result in the desired visual condition of a more open and natural appearing landscape, which will enhance views from Highway 50 and the South Fork of the American River.

## ALTERNATIVE D

**1. Reduce the risk of stand-replacing fires --** The scattered nature of harvest/burn units and their small size (generally less than 40 acres) makes this alternative only marginally effective in reducing the potential threat of catastrophic wildfire. After harvest operations are completed under Alternative D, approximately 1,765 acres would be prescribed burned, 72% less than in Alternative B (which calls for 6,303 acres of burning). This represents a mere 10% of the total project area. The treated areas would not form a continuous zone of reduced fuel loading to significantly retard the spread of a wildfire. Since approximately 90% of the project area would have no fuels treatment, it would remain in a high fire hazard condition upon completion of the project. This leaves the risk of a large, stand-replacing wildfire at high levels. Alternative D also has no shaded fuelbreaks constructed. From a fire and fuel management perspective, this proposal is very similar to past management actions in this area. Under Alternative D, the potential catastrophic burn acreage would still exceed 13,000 acres (compared to about 7,400 acres in Alternative B). Still, approximately 4,900 acres would be less likely to burn as a result of treatment under this alternative than Alternative A.

**2. Minimize cumulative effects to natural resources --** Of the action alternatives, this alternative proposes the lowest number of acres to be treated by timber harvest, prescribed burning, and machine piling activities, and therefore has the fewest cumulative effects to the natural resources present in the project area. Commercial thinning, with secondary biomass removal, is the primary harvest prescription (1,524 total harvest acres). Prescribed burning will take place on 1,765 acres. The absence of large blocks of treated land also reduces the landscape benefits that would be derived from burning.

The 3,133 fewer acres harvested in Alternative D represent a substantial reduction of potential effects to geology and soils as compared to Alternative B. The effects will be mitigated in the same way as in Alternative B (i.e., following the LRMP standards and guidelines, Draft Region 5 Soil Quality Standards, and BMPs; emphasizing the use of existing skid trails and landings, with skid trails and landings subsoiled after use and ground cover spread over selected bare surfaces; limiting operations during periods of wet weather; and seeding and mulching understory burning areas where "hot spots" may reduce ground cover below acceptable standards). Because of the reduced harvest, the cumulative watershed effects are also greatly reduced. Only Riverton Watershed exceeds the threshold for a period expected to last two years.

The beneficial effect of a reduced risk of catastrophic wildfire is significantly less in Alternative D than all the other "action" alternatives. Still, if a catastrophic wildfire were to occur, it would be likely to cause the greatest adverse effects to the soil resource, including increased erosion rates, increased sedimentation and loss of long term soil productivity.

**3. Reduce the risk of fire from and to private residences --** The areas treated for fuels would not cover an area large enough to significantly retard the spread of a wildfire. No shaded fuelbreaks would be constructed. Approximately 90% of the project area would have no fuels treatment and would remain in a high fire hazard condition upon completion of the project. This leaves the risk of a large, stand-replacing wildfire at high levels on roughly 13,000 acres. Although approximately 4,900 acres would be less likely to burn as a result of treatment under this alternative, the risks from and to private residences as part of this proposal remain high.

**4. Balance the wildlife need for snags with the public/forest worker risks from snags --** Under Alternative D, 15 miles of road would be treated and 2,250 snags would be felled along the road system, representing a reduction of approximately 2.3 snags per acre on harvested lands (under Alternative B, 4,500 snags would be removed on 30 miles of road). No additional snags within the harvest areas would be felled to meet fuels and safety considerations across the harvested landscape. The falling of a total of 2,250 snags would represent a reduction of an estimated 2.0% of the snags within the project area (compared to a total of 8,500 snags for a reduction of 8.0% of the total snags in Alternative B). After harvest, snags would average 8.0/acre with a basal area of approximately 15.2 ft<sup>2</sup>/acre (1.9 ft<sup>2</sup>/tree). Snag levels would be reduced along 15 miles of roadways under this alternative, making it safer for firefighters to use those roads as control lines and travel corridors during suppression efforts. This increased benefit to safety is less than in all other alternatives, except Alternative A (No Action). Snags outside of harvest areas and away from roads will not be removed.

The retention of large trees in harvest areas under CASPO prescriptions would provide potential large future snags. Snag levels on the majority of the Whale Rock area will remain unaffected, as no activities are planned over most of the area. Cavity nesting bird densities would be near maximum because 8 snags per acre (5 greater than the 3 snag per acre standard) will be maintained over the project area. Although some snags will be created by burning, prescribed burning over consecutive years might reduce snags and downed woody material on the forest floor. This may affect species that depend on those materials, such as spotted owls. However, this potential is least likely in this alternative, as only 10% of the project area will be treated with burning. Snag levels will be monitored, and if they fall below desired levels, snag recruitment will be used to replace incidental losses. This is not expected to be necessary, however.

**5. Maintain rural economic vitality --** This alternative would generate \$1,094,000 in timber receipts, of which \$364,830 would go to local counties. An estimated 83 full-time jobs would be created under the alternative. The sale of 6,415 MBF of timber represents about 4% of one year's mill capacity for the largest mill in the county and about 16% of mill capacity for the smaller mill. The suppression cost savings on the 4,900 acres which are less likely to burn due to fuels treatment would be \$4,900,000 (compared to \$10,600,000 in Alternative B). The savings in reduced foregone timber values are estimated at \$49,000,000 (\$106,000,000 in Alternative B).



**6. Maintain or enhance late seral (old growth) habitat conditions --** Thinning large areas will open the forest up, allowing those trees that are left standing to reach late seral forest conditions at a faster rate than if no harvesting were to take place. An estimated 12 acres of 4N,G stands will be harvested in Alternative D (249 acres less than Alternative B). Stands will retain their late seral attributes and will not be further fragmented, because all 12 acres of 4N,G stands proposed for harvest will retain the large tree element and at least 40% crown closure. Changes in vegetation strata class 3 will result due to harvest, with 673 acres converted from class 3 to size class 4 (1,292 acres less than in Alternative B).

Prescriptions are intended to perpetuate the large tree element characteristic of late seral forests. Treated stands will be more open and parklike in the long term, and will continue their development towards maturity. The gradual increase in late seral habitat will reduce the amount of fragmentation that is present within the project area. If no stand-replacing fires occurred, over 60% of the project area would be in a late seral condition in 50 years. It is estimated that with harvests, but no wildfires, the amount of 4N,G strata would increase from 1,995 acres (13.8% of project area) to 9,450 acres (67% of project area) within 50 years, thus reducing the amount of fragmentation currently present in the project area. All of the size class 2 strata will have become at least size class 3 strata, and some of the size class 2 strata will have become size class 4 strata. All of the existing young plantations will have become size class 3 strata. It is expected that the only locations where size class 2 strata would occur are on those lands where conifers do not dominate, such as lands dominated by black or canyon oak, and brushfields through which conifers are emerging.

**7. Maintain or enhance early seral habitat conditions --** With over 60% of the project area in a late seral condition in 50 years, late seral conditions would tend to be the dominant condition and fragmentation would be associated with the early and mid-seral types. Without natural disturbance occurring, additional activities (thinning, burning, etc.) would need to be implemented in the project area in the future to maintain early seral habitat conditions. Since relatively few acres will be prescribed burned in this alternative, many of the brushfields would become increasingly decadent, continuing the trend towards low quality habitat for the winter deer herd.

**8. Maintain or enhance sensitive plant habitat --** Risks of mechanical damage to individual plants are reduced because only 4 sensitive plant occurrences are in or adjacent to proposed harvest units in Alternative D (compared to 11 in Alternative B). These will be protected through flag-and-avoid measures. Understory burning in sensitive plant habitat and near occurrences may contribute to an increase in plant numbers through reduction of competition and ground cover. Exposure of mineral soils may also increase the germination and establishment rate for sensitive plants. Corridors for potential exchange of genetic material will be created through burning, thinning and biomassing. Although Sale Area Improvement funds would be collected to control the spread of exotic plant species in the project area, less of these monies would be available in this alternative than any of the others (except No Action), as considerably less stumpage is generated.

**9. Maintain economic practicality --** Costs of implementing Alternative D are estimated at \$1,199,093. The harvest of 6,291 MBF would generate \$1,459,325 in timber receipts, of which \$364,000 would go to the local counties. This alternative generates sufficient funds to carry out a program of prescribed burning. However, the fact that the harvest units tend to be scattered reduces the efficiency with which the units can be burned and decreases the efficacy of burning in achieving the Desired Condition on a landscape-wide scale.

**10. Maintain air quality --** Harvested units and selected lava caps with existing low fuel loading are the only acres to be burned. The low level of prescribed burning means that impacts to air quality from the burning program are minimized. Prescribed burning will result in emissions of approximately 720 tons of PM 10 (73% less than for Alternative B). These emissions will be spread over a total of 350 days during a 7 year period. Prescribed burning will reduce the fire hazard on 250 acres per year for the first 7 years and would generate an average of 103 tons of PM 10 per year during the 50 burn days of each year.

Approximately 17,240 tons of biomass will be removed from the project area under this alternative. If this biomass were to be burned in a forest fire, it would release the smoke and energy equivalent of all the woodstoves and fireplaces in the Pollock Pines area over the next 2 years and 5 months.

The effects of treating only 1,765 acres would not be enough to substantially alter the air quality degradation that would occur from catastrophic wildfires within the project area. Due to the relatively small number of prescribed burn acres in Alternative D, the largest probable catastrophic wildfire would be approximately 13,000 acres. Emissions from this wildfire would be nearly 10,600 tons of PM 10, which would probably be spread over a 10 day period (83% more tons than under Alternative B). Only Alternative A (No Action) presents more PM 10 emissions from a possible catastrophic wildfire.

**11. Maintain or enhance the unique features of the lava caps --** The lava cap plant communities will generally resemble their current condition, with shrubs becoming less conspicuous. Small trees invading the lava caps will be fewer in number due to prescribed burning. Some prescribed burn brush mortality would occur. On those lava caps where brush is beginning to dominate the plant community, fire-induced mortality would be most obvious.

**12. Avoid impacts to cultural (heritage) resources --** All activities will comply with the National Historic Preservation Act and its implementing regulations (36 CFR 800). Compliance will be directed by the stipulations in the Memorandum of Understanding between the Eldorado National Forest and the California State Historic Preservation Officer (SHPO), and all Programmatic Agreements in place between the SHPO and the Eldorado National Forest. Cultural resource sites will be identified on the ground and protected during project activities by contract provision. Sites will be monitored if project activities occur within 50 meters of their boundary.



**13. Maintain the scenic quality along the Highway 50 corridor and the South Fork of the American River --** The thinning of even-aged plantations within the viewshed areas will tend to break up the uniform green color and textured look of plantations, giving them the appearance of more open forest. Individual trees, patches of brush, open grassy areas and stands of older trees will become more noticeable, thus adding to the variety of the viewed landscape. Changes in form, line, color and texture will eventually result in the desired visual condition of a more open and natural appearing landscape, which will enhance views from Highway 50 and the South Fork of the American River.

## ALTERNATIVE E

**1. Reduce the risk of stand-replacing fires --** The number of acres prescribed burned with this alternative is at an intermediate level compared to the other alternatives. A total of 4,510 acres will have a substantial fuel reduction through prescribed burning. This area represents 31% of the total Forest Service ownership within the project area and lies on four major strategic ridgetops and southern exposures, which are critical to future prescribed burns and wildfire suppression actions. A total of 14.5 miles of shaded fuelbreaks will be constructed. In addition, approximately 49,565 tons of biomass will be removed from the harvest areas. If this biomass were to burn in a wildfire, it would be equivalent to the smoke and energy released by all the woodstoves and fireplaces in the Pollock Pines area over nearly a 7 year period.

Alternative E will substantially reduce the fire hazard on approximately 4,510 acres, thus the probability of a large stand-replacing wildfire will be reduced. This effect would be 29% less than in Alternative B, since a larger portion of the landscape (1,793 acres) would retain undesirable fire hazards.

**2. Minimize cumulative effects to natural resources --** This alternative proposes to harvest acreage levels that are intermediate in size compared to other alternatives. The environmental risks of Alternative E are correspondingly intermediate when compared to the other action alternatives. The adverse effects to the soil resource in this alternative are projected to be very small. Some increased sedimentation resulting from changes in infiltration rates caused by compaction, direct soil displacement or the reduction in the amounts of ground cover can be expected. As in the other action alternatives, the effects will be mitigated by following the LRMP standards and guidelines, Draft Region 5 Soil Quality Standards, and BMPs; emphasizing the use of existing skid trails and landings, with skid trails and landings subsoiled after use and ground cover spread over selected bare surfaces; limiting operations during periods of wet weather; and seeding and mulching understory burning areas where "hot spots" may reduce ground cover below acceptable standards. If a catastrophic wildfire were to occur, it would be likely to cause the greatest adverse effects to the soil resource, including increased erosion rates and loss of long term soil productivity.

Cumulative effects to watersheds are intermediary in Alternative E. Although 3 watersheds would exceed their TOC, all would recover within 2-8 years (generally 2 years sooner than

in Alternative B). There are 2.2 miles of new roads planned in this alternative, spread over 6 watersheds. Impacts from these roads will be minor since they will be primarily located on ridgetops and upland slopes, and not affecting any Class I or II streams. Road reconstruction will improve the control of road surface runoff and correct some of the sedimentation problems with the existing road system.

The reduction in existing vegetation through harvesting will result in a higher level of soil moisture available to vegetation. Higher levels of water availability will reduce the rate of occurrence of drought-related mortality. Riparian vegetation may benefit because moisture levels associated with streams, springs and seeps will increase and be available longer into the year, although compaction might increase surface flows and erode channel banks. Reducing the risk of fire within the stands occupied by rust resistant sugar pine will more readily assure their protection. Major oak woodland stands are not being entered for harvest and will be protected. Burning will reduce competition to black oak from shade tolerant conifers and create more open conditions. This will favor black oak, evidenced by reduced mortality, increased crown spread and increased acorn production. Over time, black oak will become a larger component of timber stands. These benefits are greater than in all alternatives except B.

Beneficial cumulative effects to wildlife are less in Alternative E than proposed in Alternative B, in that 1,793 fewer acres of wildlife habitat improvements will occur. However, Alternative E still represents significant habitat improvements to 4,510 acres. Prescribed burning, harvest activities and road construction will result in the direct disturbance to some individuals of wildlife species present in the project area. These effects will be minimal and will be controlled by project design, such as limited operating periods and road closures. Late seral species, such as spotted owl, goshawk and fishers, will benefit from the future increase in available suitable habitat brought about by thinning and prescribed burning, which allow stands to reach a late seral stage at an increased rate. Early seral species, such as deer, will benefit from small, dispersed openings created in the canopy, and from grasses and forbs that will be released from heavy slash and duff accumulations. Deer will also benefit from better quality forage through the regeneration of brushfields and oak stands. Prescribed burning of the area, along with the fuelbreak system, will reduce the risk of catastrophic fire. This will protect and improve habitat for all wildlife species in the area. Prescribed burning of nearly 600 acres of PACs will provide substantial protection to these Spotted Owl areas. However, there is some concern that burning in the PACs without a pre-burn biomass harvest will be extremely difficult due to the ladder fuels present. Multiple burn entries would be needed to successfully remove the fuels, increasing the time needed to create a more fire-resistant habitat within the PACs.

**3. Reduce the risk of fire from and to private residences --** The proposed activities in this alternative are sufficiently large as to reduce the likelihood that a high intensity wildfire would destroy treated stands or adjacent stands. Since the probability of a large fire is reduced in this alternative, the risk to and from private residences is also reduced. Due to the location of project activities, private residences would have increased protection from wildland fires originating above and to the north of their location. Protection from fires starting in the canyon below or to the south of the residences would remain the same.



Increased protection of public lands from fires originating from within the developed areas would be realized to the north and upslope of the developments, while areas downslope and to the south would remain unchanged. This benefit is greater in this alternative than in Alternatives A, C or D, and is somewhat less than afforded in Alternative B.

**4. Balance the wildlife need for snags with the public/forest worker risks from snags --** The felling of 3,750 hazard trees along 25 miles of roads will make fire suppression and burning operations safer when these roads are used for fire lines and will increase public safety along roads. This represents a reduction of approximately 1.2 snags per acre (compared to 1.0 snag per acre in Alternative B). An additional 0.8 snags per acre (about 2,500 total) within harvest areas will be felled and removed to meet fuel and safety concerns (compared to 1.0 snag per acre for a total of 4,000 in Alternative B). The falling of a total of 6,250 snags would represent a reduction of an estimated 5.5% of the snags within the project area (compared to an 8.0% reduction and 8,500 total snags in Alternative B). After harvest, snags will average 8.0 per acre, with a basal area of approximately 15.2 ft<sup>2</sup>/acre (1.9 ft<sup>2</sup>/tree). Snags outside of harvest areas and away from roads will not be removed.

The retention of large trees in harvest areas under CASPO prescriptions will provide potential large future snags for wildlife needs. Snag levels on north slopes and in PACs should remain unaffected as minimal activities are planned in these areas. Cavity nesting bird densities will be near maximum because 8 snags per acre (5 greater than the 3 snag per acre standard) will be maintained over the project area. Some snags will be created by prescribed burning. However, burning over consecutive years may reduce snags and downed woody material on the forest floor. This may affect species that depend on those materials, such as spotted owls. Snag levels will be monitored, and if they should fall below desired levels, snag recruitment will be used to replace incidental losses. Overall, Alternative E will have a positive cumulative effect on wildlife habitat by substantially reducing the possible loss of habitat due to a stand-replacing wildfire. This benefit is greater than in Alternatives A, C and D, and somewhat less than in Alternative B.

**5. Maintain rural economic vitality --** Alternative E will cost about \$2,868,601 to implement and will generate over \$4,600,000 in receipts, with about \$1,160,000 being returned to the affected counties. An estimated 250 year-round jobs will be created or maintained, and \$4,900,000 in total economic activity and \$4,231,000 in personal income will be generated. The sale of 19,492 MBF of timber represents about 15% of one year's mill capacity for the largest mill in the county and about 50% of mill capacity for the smaller mill in the county. The reduction in potential catastrophic burn acreage results in a likely reduction in future suppression costs of \$8,700,000, as well as the avoidance of \$87,000,000 in foregone timber losses.

**6. Maintain or enhance late seral (old growth) habitat conditions --** Thinning large areas will open the forest up, allowing those trees that are left standing to reach late seral forest conditions at a faster rate than if no harvesting were to take place. Proposed harvest within size class strata 3 would result in a change in size class 3 to size class 4 on 1,545 acres (411 acres less than Alternative B). In Alternative E, an estimated 363 acres of 4N,G

stands will be harvested (compared with an estimated 261 acres in Alternative B). The retention of at least 40% crown closure will assure that these stands retain their late seral attributes of size and crown closure. Prescriptions are intended to perpetuate the large tree element characteristic of late seral forests. Treated stands will be more open and parklike in the long term, and will continue their development towards maturity.

It is estimated that with harvests, but no wildfires, the amount of 4N,G strata would increase from 13.8% of project area to 67% of project area within 50 years, thus reducing the amount of fragmentation currently present in the project area. All of the size class 2 strata will have become at least size class 3 strata and some of the size class 2 strata will have become size class 4 strata. All of the existing young plantations will have become size class 3 strata. It is expected that the only locations where size class 2 strata would occur are on those lands where conifers do not dominate, such as those dominated by black or canyon oak, and brushfields through which conifers are emerging.

**7. Maintain or enhance early seral habitat conditions --** With 67% of the project area in a late seral condition in 50 years, late seral forests will tend to be the dominant habitat type, and fragmentation would be associated with early and mid-seral types. Without natural disturbance occurring, additional activities (thinning, burning, etc.) would need to be implemented in the project area in the future to maintain early seral habitat conditions. The prescribed burning of decadent brushfields proposed in this alternative will regenerate those areas and provide better quality forage to the Pacific deer herd.

**8. Maintain or enhance sensitive plant habitat --** There are risks of mechanical damage to individual plants, as 10 sensitive plant occurrences are in or adjacent to proposed harvest units under Alternative E. These will be protected through flag-and-avoid measures. Lava caps, on which two sensitive species are found, will be incorporated into proposed fuelbreaks. Understory burning in sensitive plant habitat and near occurrences may contribute to an increase in plant numbers through reduction of competition and ground cover. Exposure of mineral soils may also increase the germination and establishment rate for sensitive plants. Corridors for potential exchange of genetic material will be created through burning, thinning and biomassing. Sale Area Improvement funds will be collected to control the spread of exotic plant species in the project area that may adversely affect sensitive plants.

**9. Maintain economic practicality --** Alternative E proposes thinning of 1,124 MBF from 562 acres of existing plantations and 12,233 MBF from 2,203 acres of natural stands. Total quantities of sawtimber and biomass to be removed are estimated at 19,492 MBF and 49,565 tons, respectively. Fuels treatment would occur on a total of 4,510 acres, 590 of which would be in non-harvested portions of PACs. Alternative E would cost about \$2,868,601 to implement and would generate over \$4,600,000 in receipts, with about \$1,160,000 returned to the affected counties. This alternative funds prescribed burning operations through dollars collected from timber receipts, thus consistent funding of the prescribed burning program is reasonably assured for the next 5 to 10 years.



**10. Maintain air quality --** Alternative E proposes prescribed burning that will result in emissions of approximately 1,900 tons of PM 10 (28% less than Alternative B) spread over a total of 350 days during a 7 year period. Implementation of this alternative would require the prescribed burning of approximately 644 acres per year during the burning cycle, with an average 270 tons of PM 10 per year generated during the 50 days of burning per year. With treatment, the largest probable catastrophic wildfire would be around 9,200 acres. Emissions from this would be 7,280 tons of PM 10, which would be spread over a 10 day period; this is 26% more PM 10 than would occur from a large wildfire under Alternative B.

**11. Enhance the unique features of the lava caps --** The lava cap plant communities will generally resemble their current condition, with shrubs becoming less conspicuous. Lava caps, on which two sensitive species are found, will be incorporated into proposed fuelbreaks. Small trees invading the lava caps will be fewer in number due to prescribed burning. Some prescribed burn brush mortality would occur. On those lava caps where brush is beginning to dominate the plant community, the fire-induced mortality would be most obvious.

**12. Avoid impacts to cultural (heritage) resources --** All activities will comply with the National Historic Preservation Act and its implementing regulations (36 CFR 800). Compliance will be directed by the stipulations in the Memorandum of Understanding between the Eldorado National Forest and the California State Historic Preservation Officer (SHPO), and all Programmatic Agreements in place between the SHPO and the Eldorado National Forest. Cultural resource sites will be identified on the ground and protected during project activities by contract provision. Sites will be monitored if project activities occur within 50 meters of their boundary.

**13. Maintain the scenic quality along the Highway 50 corridor and the South Fork of the American River --** The thinning of even-aged plantations within viewshed areas will tend to break up the uniform green color and textured look of plantations, giving them the appearance of a more open forest. Individual trees, patches of brush, open grassy areas and stands of older trees will become more noticeable, thus adding to the variety of the viewed landscape. Changes in form, line, color and texture will eventually result in the desired visual condition of a more open and natural appearing landscape, which will enhance views from Highway 50 and the South Fork of the American River.

## KEY DIFFERENCES BETWEEN ALTERNATIVES

Several actions proposed in the various alternatives distinguish them from one another (Tables 2 and 3). An adaptive management strategy allowing for harvesting in three PACs, with post-harvest light understory burning, is proposed only in Alternative C. Prescribed burning in PACs without a pre-harvest entry is proposed in Alternatives B and E, but not in Alternative D. Construction of shaded fuelbreaks is included only in Alternatives B and E. Snag and down logs will remain at existing levels in Alternative A; in the remaining

alternatives, they will be managed at levels specified under the CASPO Amendment to the LRMP.

The alternatives also display differences in the total acres and volume harvested, volume of sawtimber removed, amount of biomass removed, number of harvest acres machine-piled, number of harvest and non-harvest acres prescribed burned, and the amount of stumpage generated. Alternative B represents the high range of these values, Alternative D represents the low range, with Alternatives C and E displaying values intermediary between B and D. The alternatives also vary in the miles of proposed newly constructed road, and in the number of road miles slated for reconstruction. In this case, Alternative E has the largest number of new and reconstruction road miles. Alternative C has the least new road miles proposed and Alternative D the least road reconstruction miles (exclusive of the No Action Alternative). Alternative B has intermediary new and reconstruction road miles proposed. Although all the action alternatives help to move the project area toward the desired condition as defined in Chapter I, each differs with respect to how much of the project area is moved in that direction and how quickly each helps achieve the desired condition. These differences formed the primary basis for the selection of the preferred alternative, as described below.

## **THE PREFERRED ALTERNATIVE**

Alternative E, the Multi-Resource Management Emphasis, is identified as the Preferred Alternative in accordance with section 1502.14(e) of the National Environmental Policy Act Regulations. This alternative provides for the best blend of management actions to economically meet the desired condition for the Whale Rock area while addressing all the issues. Alternative E also represents the best balance between fuels reduction, current Regional Forest Management direction, the protection of wildlife habitat and the enhancement of biodiversity.

In terms of the selection process for the preferred alternative, Alternative A was rejected, since taking no actions on the landscape to reduce fuel loads would leave the project area at high risk for catastrophic, stand-replacing wildfire. Should such a fire occur, it would have the greatest effect on the collective resources present in the project area. Forest health, as measured in terms of the ability of the area to maintain its structure and complexity in the face of this type of large-scale disturbance, would be compromised.

Alternative B reduces fuel loads and moves the greatest amount of the project area toward the desired condition. However, Alternative B achieves this with the greatest potential adverse effects to the resources resident in Whale Rock. In particular, watershed cumulative effects are highest in this alternative. Since Alternative B creates the largest amount of potential adverse effects overall, it was not selected as the preferred alternative.

Alternative C was designed to benefit wildlife needs while also meeting the desired condition. Alternative design was based primarily on two assumptions: 1) that reducing



the risk of catastrophic fire by reducing fuel loads was beneficial to wildlife by creating a healthier, more sustainable forest, and 2) that removing those fuels with the least amount of mechanical ground disturbance would provide the greatest benefits to wildlife. However, it was discovered during the analysis (Chapter IV) that in the case of the second assumption, the number of burn cycles needed to reduce fuels on the 3,075 acres of land *not* subject to a pre-burn thinning entry rose from a single 7-year cycle to 4-5 cycles, or a minimum of 21-28 years, as compared to treating the same acreage with pre-burn thinning. Overall, a larger portion of the project area and all its resources (including wildlife) would be left at a higher risk of catastrophic fire during this extended period of time. Since a catastrophic stand-replacing fire would result in the greatest disturbance to wildlife, and since the time frame to meet the desired condition is substantially extended in Alternative C, especially as compared to Alternatives B and E, it was not selected as the preferred alternative.

Alternative D proposes the least acreage of harvest and prescribed burning of the action alternatives, with the least amount of direct disturbance to the area resources. Since no large blocks of land were proposed for treatment, larger portions of the project area would receive no fuels reductions and larger acreages would remain at high fire risk at the end of the project than in the other action alternatives. The scattered nature of the harvest and burn units in this alternative make it only marginally effective in reducing the potential for catastrophic fire. This, in turn, decreases the efficacy of the activities in achieving the desired condition on a landscape-wide scale.

Alternative E proposes fuels reduction through thinning and harvest that are intermediary between Alternatives B and D, and at slightly higher levels than Alternative C. Compared to Alternative C, however, this alternative proposes only 861 acres of prescribed burning on lands not subject to a pre-burn harvest entry, thus reducing fuel loads on larger acreages than Alternative C in far less time (7 years as compared to 21-28 years in Alternative C). In addition, Alternative E proposes construction of 14.5 miles of shaded fuelbreak, thus offering added landscape-wide fire protection. Since a larger portion of the project area would move toward the desired condition in far less time than in Alternatives C or D, and since fewer negative effects would result from implementing Alternative E than would result from Alternative B, Alternative E was selected as the preferred alternative for the Whale Rock project.

Key differences between alternative management strategies for Alternatives A through E are provided in Table 2 on the following page. Table 3 highlights the distinguishing characteristics of Alternatives A through E. Those alternatives which were considered but not analyzed in detail are discussed following Table 3.

Table 2. Summary of Key Differences Between Alternative Management Strategies					
Management Activity	Alternative Management Strategies Under CASPO				
	Interim Guidelines				
	A No Action	B Fuels	C Wildlife w/ Adapt. Mgt.	D Timber	E Multi. Res.
<b>Harvest Related</b>					
Plantations Thinned (Acres/Volume in MBF)	0	562/1124	562/1124	562/1124	562/1124
Total Fuelbreaks Planned (Miles)	0	14.5	0	0	14.5
Constructed Fuelbreaks Harvested -Natural Stands (Acres/Volume in MBF) <sup>1</sup>	0	914/6135	0	0	914/6135
Other Natural Stands Harvested (Acres/Volume in MBF)	0	3181/15,167	1986/11,840	962/5291	2203/12,233
Total Natural Stands Harvested (Acres/Volume)	0	4095/21,302	1986/11,840	962/6291	3117/18,368
Total Acres Harvested	0	4657	2548	1524	3679
Total Sawtimber Removal (MBF)	0	22,426	12,964	6,415	19,492
Total Biomass Removal (Tons)	0	67,169	31,895	17,240	49,565
New Road Construction (Miles)	0	1.7	1.0	1.6	2.2
Road Reconstruction (Miles)	0	29.3	19.2	14.9	32.1
PACs Harvested (#) (Acres Included Above)	0	0	3(141)	0	0
<b>Post Harvest Related</b>					
Total Harvest Acres Machine Piled <sup>2</sup>	0	1024	462	240	777
Total Harvest Acres Prescribed Burned <sup>3</sup>	0	3633	2086	1284	2902
Total Non-Harvest Acres Prescribed Burned <sup>4</sup>	0	1646	3075	241	831
Total Acres Burned <sup>5</sup>	0	6303	5623	1765	4510
Lava Caps Prescribed Burned <sup>6</sup>	0	241	241	241	241
PACs Prescribed Burned <sup>7</sup>	0	590	493	0	590
Stumpage \$ Generated <sup>8</sup>	0	5,235,750	3,055,500	1,459,325	4,624,500

<sup>1</sup> All harvested areas in fuelbreaks are within natural stands. <sup>2</sup> Machine piles will be burned. <sup>3</sup> Total harvest acres prescribed burned; prescription will call for understory burning. <sup>4</sup> Total non-harvest areas prescribed burned; prescription calls for understory burning. <sup>5</sup> Total acres burnt; includes harvest acres, non-harvest acres, and machine-piled acres. <sup>6</sup> Acreage of lava caps prescribed burned included in non-harvest acres prescribed burned. <sup>7</sup> Acreage of PACs prescribed burned included in harvest acres prescribed burned and/or non-harvest acres prescribed burned. <sup>8</sup> Stumpage reflects harvested timber values only, not cost of implementing alternative. Values reflect stumpage rates of \$250/MBF and biomass cost of \$200/ac.



<b>Table 3. Distinguishing Characteristics of the Alternatives</b>					
Action	Alternative				
	A	B	C	D	E
Harvest in PACs	no	no	yes	no	no
Burn in PACs	no	yes	yes	no	yes
Fuelbreaks	no	yes	no	no	yes
Snag & Down Logs <sup>1</sup>	Existing	LRMP	LRMP	LRMP	LRMP
Adaptive Management	no	no	yes	no	no
Designed to Address Issues Number	2,6,8, 10,12, 13	1,3,4, 9,11	11,4,6, 7	4,5,9	1,3,4, 5,6,7, 9

<sup>1</sup>LRMP = LRMP levels with CASPO amendment

## ALTERNATIVES ELIMINATED FROM FURTHER STUDY

The IDT considered a range of alternatives before determining which should be considered in detail. Those alternatives eliminated from detailed study, along with the rationale for their elimination, are presented below.

### MANAGEMENT ACTIVITIES WITHIN THE PEAVINE RESEARCH NATURAL AREA

The Eldorado LRMP Management Area direction for the 1,113 acre Peavine Research Natural Area (RNA) is aimed towards the protection of the undisturbed ecosystem for future research, study, observation, monitoring and educational activities that are non-destructive and non-manipulative (LMRP 4-137). In accordance with the Decision Notice by the Chief of the Forest Service establishing the Peavine RNA (dated 1/14/92), specific, permitted management activities in the RNA will be allowed following the development of a Research Natural Area Management Plan by the Eldorado National Forest and the Pacific Southwest Forest and Range Experiment Station. The Peavine RNA Management Plan has not yet been written, therefore no manipulative management activities are permitted by policy.

## **CONDUCTING SUBSTANTIAL MANAGEMENT ACTIVITIES ON STEEP LANDS**

The IDT considered the desirability of developing an alternative that would include widespread skyline cable or helicopter operations upon slopes greater than 35% within the Whale Rock project area. There are a number of areas on the steeper slopes where fuel loadings are similar to those found on the gentler slopes. The IDT felt that though fuels reduction on these steeper slopes was desirable, the inherent limitations of equipment use and the increased risk of cumulative effects to watersheds relegated these areas to a lower priority than those slopes less than 35 percent. Early on, the IDT determined that the harvesting and prescribed burning of substantial acreages would be likely to cause watershed concerns, particularly in watersheds that have a history of extensive harvest activities. Avoiding much of the steep ground would in effect provide substantial "buffer zones" along many of the streamcourses. Upon project completion, assessments could be made of actual versus projected impacts, and the desirability of implementing similar fuels reduction programs on steep ground could be made in light of knowledge gained from this project.

## **ENLARGEMENT OF STREAMSIDE MANAGEMENT ZONE WIDTHS**

The Eldorado LRMP contains guidelines for establishing streamside management zone (SMZ) widths to meet watershed maintenance and rehabilitation needs. The recommended guidelines vary by stream class, soil/slope stability and seasonal flow patterns associated with specific streamcourses. The guidelines were intended to be adjusted as on-the-ground conditions dictate. The recommended widths vary from a minimum of approximately 50 feet for Class IV streams to a maximum of more than 600 feet for perennial Class I drainages located in unstable watershed conditions.

In March of 1993, the Forest Service published the Viability Assessments and Management Considerations for Species Associated with Late-Successional and Old-Growth Forests of the Pacific Northwest (the SAT Report). This publication summarized the findings of the Scientific Analysis Team in response to questions and concerns expressed by U.S. District Court Judge William L. Dwyer regarding the Forest Service's Final Environmental Impact Statement on Management for the Northern Spotted Owl in the National Forests (USDA 1992). The SAT Report assessed risks to other species, including fish, associated with old-growth forests. The SAT Report recommended interim buffer widths that varied from a minimum of 100 feet on either side of seasonal, intermittent streams to 300 feet on each side of fish-bearing streams.

The Whale Rock IDT considered the proposition of alternatives that included the SAT recommendations. However, upon review and discussion of the SAT guidelines, the IDT concluded that the LRMP guidelines provided ample opportunity to apply SMZ widths



equal to, or greater than, those contained in the SAT Report. The LRMP guidelines provide the needed flexibility to account for the fact that the Whale Rock project area does not have any 'at risk' fish species. In addition, the Whale Rock IDT recognized that the LRMP recommendations were based upon local experience, monitoring and conditions, including soil type and stability, weather patterns, and water quality assessments. Finally, since all alternatives considered in detail emphasize operations on upper slopes and ridgetops and preclude operations on steep slopes and the lower third of most drainages, the areas where no ground disturbing activities would occur (streamside buffer zones on Class I-III drainages) actually exceed the SAT Report recommendations on most of the drainages in the Whale Rock analysis area.

### **WILDLIFE MANAGEMENT EMPHASIS WITHOUT ADAPTIVE MANAGEMENT**

This alternative is identical to Alternative C, with the exception that pre-burn thinning would not be allowed within the PACs (Alternative C proposes thinning on 141 acres in PACs), resulting in thinning of 1,592 MBF less sawtimber than Alternative C, and the removal of 1,410 tons less biomass. Light understory burning on 493 acres within the PACs was proposed (the same as Alternative C). The acreage protected from wildfire was found to be the same as Alternative C. Since this alternative was so similar to Alternative C, the IDT decided to drop this proposal from further consideration.

### **APPLICATION OF FUELS TREATMENT ON NON-PUBLIC LANDS IN WHALE ROCK**

The IDT recognized that the objective of improving the overall forest health of the Whale Rock area is partially dependent upon actions taken or not taken upon private lands. During the scoping process and the development of alternatives, the Forest Service contacted all private landowners within the Whale Rock area to determine if there was common interest in solutions to the identified issues. The Forest Service received responses from a number of landowners indicating a willingness and decided interest in improving conditions within the project area that would be mutually beneficial. The largest private landowner, Sierra Pacific Industries, has expressed an interest in coordinating with the Forest Service in terms of shaded fuelbreak construction and prescribed burning. The absence of coordination would impair the overall effectiveness of some of the proposals contained in the Whale Rock alternatives, but would not invalidate them.

Though the Forest Service has no jurisdiction over the private lands within the project area, the IDT recognized that the Forest Service can encourage activities on adjacent lands through example and education. An alternative proposing direct Forest Service investments on the private land was dismissed from detailed development because current laws, regulation and policy preclude such actions.

## **ATTAINMENT OF THE DESIRED CONDITION BY PRESCRIBED BURNING ONLY**

The IDT recognized that it is conceivable, with unconstrained budgets and unlimited time, that the Desired Condition for the Whale Rock Project, as described in Chapter I of this EIS, could potentially be attained by prescribed burning alone. Understory prescribed burning has been conducted in a number of the stands within the Whale Rock project area during the last decade. However, considerable experience has shown that using only prescribed fire, without any prior, preparatory fuels manipulation in high fuel loading situations, is a very tenuous, expensive and time consuming proposition requiring multiple entries over a longer period of time to achieve the same results. In high fuel loading situations, burn windows are very narrow and the potential for loss of control of the prescribed burn is present. This potential loss of control carries with it a risk of substantial or potentially catastrophic resource damage. To reduce the risk, prescribed burning must be done very slowly and the effort becomes very labor intensive and expensive.

Given past experience and the predicted limited budgets, it would be very unlikely that desired improvements in the forest health of the Whale Rock project area could be attained by prescribed burning alone. This conclusion follows the recommendations of the Policy Implementation Planning Team (PIT Report) to the Steering Committee for the California Spotted Owl Assessment (Ruth et al. 1994). This report states that "it is likely that a mix of mechanical treatments and prescribed burnings will be used to meet the CASPO recommendation for fuel treatments... mechanical removal of ladder fuel and other structural elements that might increase fire intensity should be a necessary precursor to burning" (Ruth et al. 1994).

The IDT also recognized that using only prescribed burning would result in more smoke emissions than a combination of commodity removal followed by prescribed burning. In addition, the potential commercial value realized from commodity removal would not only cover the expense of removal, but could likely cover the cost of other desired work within the project area and still return revenue to the U.S. Treasury.

## **FUELS TREATMENT WITH ADAPTIVE MANAGEMENT STRATEGIES**

This proposal was identical to Alternative B, with the exception that harvest activities would occur within 488 acres of natural stands inside PACs using an adaptive management strategy as provided for in the interim CASPO Guidelines, resulting in additional thinning of 5,956 MBF more sawtimber than Alternative B, and the removal of 4,880 tons more biomass. The additional harvesting in the PACs would pose some increased short-term risk of disturbance to resident spotted owls. Increased harvest under this alternative also meant minor increases in watershed cumulative effects, although all watersheds affected were expected to recover at the same rate as they would under Alternative B. The acreage protected from wildfire was found to be the same as in Alternative B. Since this alternative



was essentially identical to Alternative B and offered increased threats to watersheds while not reducing the risk of wildfire, and since an adaptive management approach to harvesting in PACs was already included in Alternative C, the IDT decided to drop this proposal from further consideration.

### **MULTI-RESOURCE MANAGEMENT EMPHASIS WITH ADAPTIVE MANAGEMENT STRATEGIES**

This alternative incorporated all of the actions proposed in Alternative E, with an adaptive management strategy as provided for in the Interim CASPO Guidelines considered in the proposed down log and snag retention requirements. This alternative received initial consideration because of the concern that maintaining the CASPO snag and down log levels across the project area contributes to the high fire risk situation. This alternative recognized that a reduction in this risk could be accomplished by reducing the number of snags and down logs within the project area. Snag and down log levels were proposed to be reduced in areas of treatment to pre-CASPO LRMP guidelines of an average of 0.7 snags per acre and 3 down logs per acre.

In addition, this proposal considered the value resulting from an increase in the effectiveness of fire suppression efforts by reducing the risk of snags to wildland fire fighters. Fires can generally be fought more directly and aggressively if the risks of fire fighter injury associated with snags are reduced. Greater fire suppression effectiveness would also translate to a reduced risk of catastrophic fire. Experienced fire suppression personnel recognize that under most wildland fire fighting scenarios, high numbers of snags and down logs will also contribute to fires that have high potential for long distance spotting with increased resistance to control. Additionally, the reduction in biomass tonnage would be increased by about 31,000 tons over Alternative B because of the greater numbers of snags and down logs to be removed. This increased removal of biomass beneficially affects the fuel loadings, since less fuels are available to burn in a prescribed fire or wildfire.

The primary objective of treating snags and down logs to these levels was to better reduce the fire and safety hazards associated with high levels of snags and down logs. This proposal also offered a balance between the levels of snags beneficial to wildlife and the fuels and safety problems associated with high snag levels and catastrophic fire. The snag level reductions proposed (approximately 41,000 snags) also addressed the issue of public and forest worker safety. However, there is no accepted fire modeling technique available to indisputably display the role that snags play in rates of fire spread. In addition, current fire modeling indicates that the reduction in potential catastrophic burn acreage is the same in this alternative as for Alternative E. Despite the model, District fire and fuels specialists believe that there would actually be a greater reduction in acreage burned under this alternative because of fewer snags contributing to long-distance spotting and the reduced fuel loads, although there is no generally accepted way of quantifying these numbers.

Since this alternative proposed activities identical to Alternative E, with the exception of snag and down log removal, and since it could not be demonstrated through modeling that this alternative reduces the potential size of a catastrophic wildfire over Alternative E, the IDT decided to drop this alternative from further analysis. Furthermore, current interpretation of the spotted owl interim guidelines is that snag levels may not be changed simply to benefit the public, forest worker, or forest wildland firefighter safety.

## **SUMMARY**

This chapter provided a description of the alternatives considered in response to the principal issues and to the purpose and need for action. Distinguishing management activities associated with each alternative were discussed, as was information which applies to all alternatives. The extent to which each alternative responded to the issues was also described. The following chapter (Chapter III) describes the existing condition and affected environment of the Whale Rock project area. Chapter IV outlines the environmental consequences of implementing each of the alternatives considered in detail. Specific mitigation and monitoring required for individual resources are discussed with each alternative by resource area in Chapter IV. Mitigation measures common to all action alternatives are included at the end of Chapter IV. A monitoring plan can be found in Appendix J.



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## **CHAPTER III**

# **EXISTING CONDITION AND AFFECTED ENVIRONMENT**

## **INTRODUCTION**

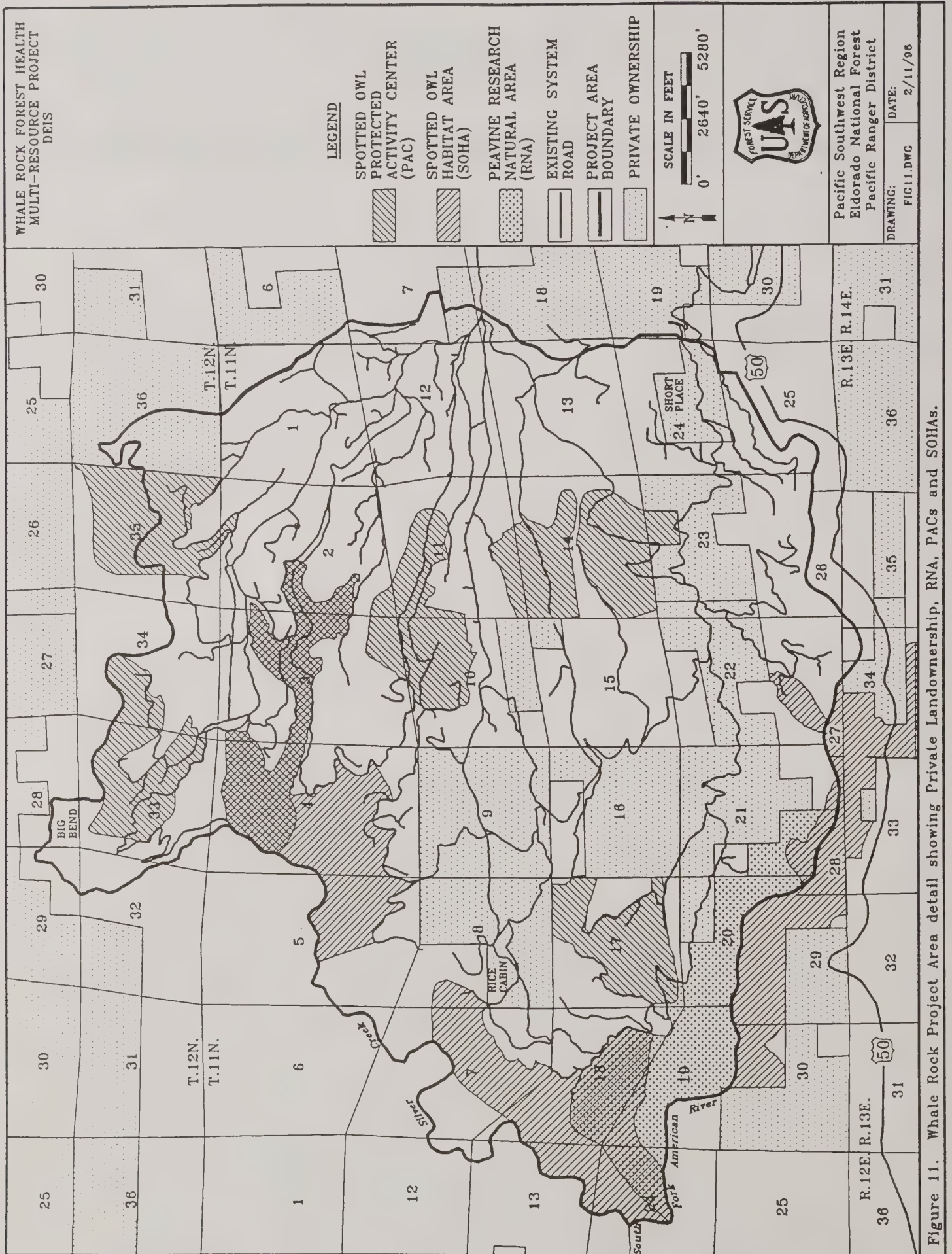
This chapter discusses the conditions of the environment relative to the issues and the purpose and need for action. It focuses on the physical, biological, economic and social conditions that may be affected by implementing the alternatives, and provides a basis for understanding and evaluating the environmental consequences of the alternatives which are discussed in detail in Chapter IV. Conditions pertaining to the project goals and major issues are discussed here in greater detail than other resource values, although some discussion of baseline conditions is included for the various resource values present. Understanding the present environment of the project area is essential to seeing how each alternative could change that environment.

## **WHALE ROCK PROJECT LOCATION**

The Whale Rock Analysis Area lies within the Pacific Ranger District of the Eldorado National Forest. The reader is referred to the Eldorado National Forest Land and Resource Management Plan (LRMP) Environmental Impact Statement, Chapter III, for an overview description of the Eldorado National Forest.

The Whale Rock Analysis Area covers approximately 18,000 acres bounded on the south by the South Fork of the American River, on the west and north by Silver Creek and on the east by the western margin of the area burned in 1992 by the Cleveland Fire. The project area is located entirely in El Dorado County in Township 11 N, Range 12 E, in all or portions of Sections 12, 13 and 24 (MDBM); Township 11 N, Range 13 E, in all or portions of Sections 1-24; Township 11 N, Range 14 E, in all or portions of Sections 6-7, 18-19, and 30; and Township 12 N, Range 13 E, in all or portions of Sections 28-29 and 32-36 (Figure 11). Elevations range from 2,080 feet at the confluence of Silver Creek with the South Fork of the American River to 5,080 feet on Peavine Ridge on the east edge of the project area. The area is accessed from Highway 50 by the Icehouse Road (Primary Forest Route 3), White Meadows Road (County Road 11N65/11N64) and Peavine Ridge Road (Forest Road 11N63).





## **LAND OWNERSHIP**

There is considerable private land within the Whale Rock analysis area. The majority of the 4,000 privately owned acres are held by Sierra Pacific Industries. Small parcels are owned by 38 other land owners, 30 of which have structures on their property. Sixteen residents live in the Whale Rock area year-round. Sacramento Metropolitan Utilities District (SMUD), PacTel and Pacific Gas and Electric (PG&E) have special use permits for power and telephone transmission lines across the area.

## **FOREST LAND MANAGEMENT DIRECTION**

The principal LRMP emphasis zones and management areas potentially affected by the Whale Rock Project include a Designated Research Natural Area, Wildlife Management Areas, Streamside Management Zones and General Forest Zones. A brief summary of the general direction for each area is given below. A complete discussion of the management practices, general forest direction, and standards and guidelines for each area are included within the Eldorado National Forest LRMP.

### **Research Natural Area**

A small portion of the Whale Rock Area (1,113 acres) bordering the South Fork of the American River is within the Peavine Designated Research Natural Area (RNA). This RNA is situated on the steep south- and west-facing slopes of the river canyon, extending from near the confluence of the river with Silver Creek east to a point in the canyon below Spring Valley (refer back to Figure 14). Management emphasis in the RNA is on maintaining a natural condition and limiting uses to research, observation, study, monitoring, and educational activities that are both nondestructive and nonmanipulative (LRMP 4-136). General direction in this area includes maintaining and enhancing habitat for fish and wildlife; managing oaks and other hardwoods for wildlife benefits, utilizable products, and aesthetic values; and managing fuels using prescribed fire and other techniques to preserve vegetation for which the RNA was established (see LRMP 4-136 to 141).

### **Wildlife Management Areas**

Management emphasis in the 5,274 acres of Wildlife Management Areas in Whale Rock includes protecting and managing mature timber stands that provide suitable habitat for late successional wildlife species including spotted owl and goshawk, and maintaining viable populations of threatened, endangered, and sensitive wildlife species. General Forest direction in these areas includes protecting and improving habitat for threatened, endangered, and sensitive species; retaining timber stand characteristics essential to wildlife dependent on mature timber seral stages; and minimizing environmental impacts and resource losses caused by wildfires through treatment of natural fuels (see LRMP 4-27, 4-211 to 219).



Much of the Whale Rock area is designated as critical winter range for the Pacific deer herd, and all activities within the critical winter range will be conducted according to the Pacific Deer Herd Management Plan (Hinz 1981). The loss of portions of the herd's critical winter range in the adjacent Cleveland Fire area (which burned in 1992) necessitates more intensive management of habitat in the Whale Rock area in order to assure the sustainability of the Pacific herd.

The Regional Forester amended the LRMP in January, 1993, by implementing the California Spotted Owl (CASPO) guidelines. Those guidelines modify timber and fuels management direction to emphasize practices which will reduce fuel ladders and increase the tolerance of the forest to fire primarily for the benefit of the California spotted owl (CASPO EA Decision Notice 1993:3-4).

### **General Forest Management Areas**

Management direction in the General Forest Emphasis Zone is on providing multiple uses (including intensive timber, dispersed recreation, range, water, and wildlife management) while achieving appropriate visual quality objectives in specific road and river corridors. Lands within the General Forest classification are most favorable for growth and harvest of commercial conifer species, although low-site and non-suitable timber growing areas are also included within this zone.

Eight General Forest Management Areas are located within the Whale Rock project limits. These are:

- Visual Foreground Retention (#20) and Partial Retention (#21);
- Visual Middleground Retention (#22) and Partial Retention (#23);
- High Site Timber (#24);
- Low-Site Timber (#26); and
- Maintenance (#29).

Specific management direction for each of the above areas is outlined in the LRMP (4-27, 4-221 to 286).

### **Streamside Management Zones**

One of the primary purposes of the Streamside Management Zone is to maintain high water quality in lakes and streams by establishing natural filter zones between the water and soil-disturbing activities. Preservation of high water quality perpetuates other aquatic values that affect wildlife, recreation and consumptive uses. The primary purpose of this zone is to meet water quality objectives, only incidentally meeting other objectives (see LRMP 4-27, 4-287 to 296).

## EXISTING CONDITIONS

A discussion follows of the existing conditions for geology and soils, water (hydrology), vegetation diversity, timber, sensitive plants, fish and wildlife, snags and downed logs, fire and fuels, air quality, visual resources, transportation, range, recreation, cultural (heritage) resources, the historical landscape, and the social and economic environment.

### GEOLOGY AND SOILS

Approximately one-half of the Whale Rock Analysis Area is underlain with Miocene and Pliocene volcanic rocks of the Mehrten Formation. This formation is best characterized as a series of volcanic mudflows containing angular andesite rock fragments in a matrix of mud and sand. These mudflows are not unique to Whale Rock, but are found capping the ridges on most non-glaciated areas of the Eldorado National Forest. Areas of open, rocky Mehrten Formation are referred to as 'lava cap' in this document.

The remainder of the Whale Rock area is comprised of Mesozoic granitic rocks and Paleozoic metamorphic rocks of the Shoo Fly Formation. The granitic rocks are exposed along the South Fork of the American River in the southern portion of the analysis area. The older metamorphic rocks, which consist of schist, gneiss, metasandstones, metavolcanics and phyllite, are located along the steep slopes adjacent to Silver Creek.

Soils within the analysis area are formed from these geological substrates, and include soils derived from volcanic materials on the upper part of the ridges, granitic materials on the lower portions of the South Fork of the American River Canyon, and metasedimentary materials in the Silver Fork Canyon. Soils from five mapped units are represented in Whale Rock; these are briefly described below (Mitchell and Sullivan 1985):

Cohasset-McCarthy-Crozier – Moderately deep to very deep soils that are well drained and are formed in material weathered from andesitic lahar.

McCarthy-Ledmount – Shallow to moderately deep soils that are well drained and somewhat excessively well drained which are formed in material weathered from andesitic lahar (i.e., the mudflow, or lava cap).

Jocal-Mariposa – Moderately deep to very deep, well drained soils formed from weathered metasedimentary rock.

Chaix-Pilliken-Holland – Moderately deep to very deep, well drained to somewhat excessively well drained, soils derived from material weathered from granitic rock.



Rock Outcrop-Maymen-Lithic Xerumbrepts – Shallow soils that vary from somewhat excessively drained to excessively drained; formed in material weathered from metasedimentary, andesitic lahar, and granitic rock.

The primary management concerns for the above soil units include the hazard of erosion on disturbed areas, and maintaining soil depth. The steep topography of portions of the canyon areas (with an abundance of slopes above 30%) heightens the concern for soil displacement.

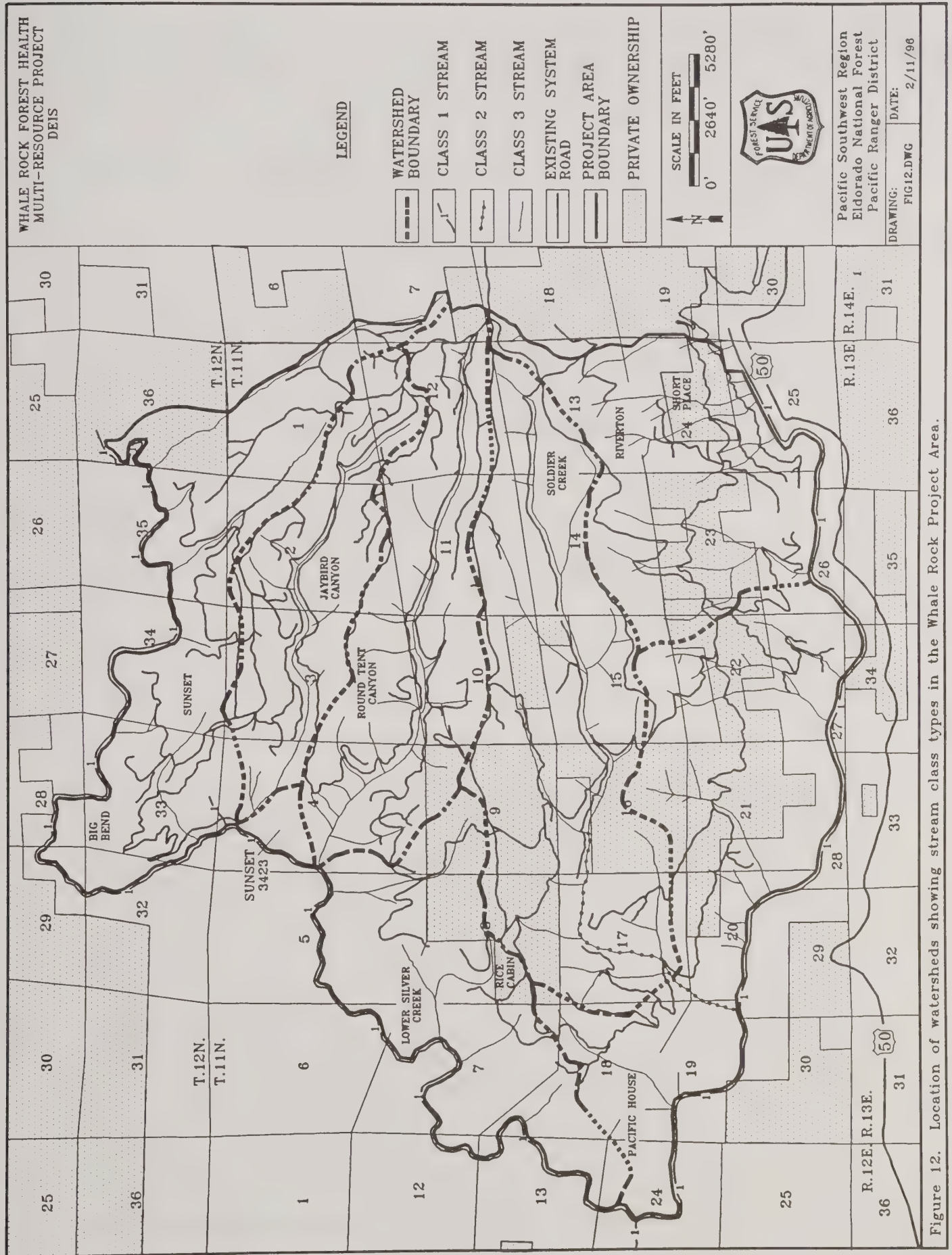
Primary landforms found in the Whale Rock Analysis Area include the broad "lava capped" volcanic ridges, eroding hillslope complexes, and steep areas of valley inner gorge. The "inner gorge" is a geomorphic feature found in some Sierran canyons, created by stream down-cutting in response to relatively rapid uplift of the Sierra within the past 3 million years. As the stream downcuts into the bedrock, the side-slopes are oversteepened and undercut, creating narrow "V"-shaped canyons. The inner gorge consists of those lowermost slopes characterized by slope gradients exceeding 65 percent. Inner gorges are considered one of the most sensitive landforms in the Forest, due to their inherent instability from oversteepened slopes. These features are susceptible to surface soil erosion, debris flows and landsliding. They are, consequently, a potential source for the rapid delivery of sediments into drainages. There are no known active landslides found outside of the inner gorge areas in the Whale Rock analysis area.

## **HYDROLOGY**

The Whale Rock Analysis Area is within the 394,446 acre South Fork American River Basin (SFAR). For analysis purposes, this Basin is divided into an upper and lower section. The 179,703 acre lower section (LSFAR) includes the seven watersheds that encompass the Whale Rock Analysis Area (Figure 12). The overall condition and sensitivity of the lower portion of the South Fork of the American River can be characterized in terms of its cumulative watershed risk levels. These are considered extreme over 23% of its reach, high over 9%, and at moderate risk over 37% of its reach. Appendix G includes a more lengthy discussion of the existing condition and cumulative watershed risk levels of the LSFAR.

## **Climate**

The project area is located in a Mediterranean climatic zone, with abundant sunshine in the summer and moderate to heavy precipitation in the winter. Temperatures vary widely in the course of the year. The area is subject to strong flows of marine air from the Pacific Ocean in the winter that results in heavy precipitation. Average annual precipitation ranges at this elevation from 50 to 60 inches, 85% of which falls between November and May as rain and snow. Summer precipitation is slight and generally limited to scattered thundershowers, which are often intense.





Peak stream flows are usually generated by spring snow melt; extreme peak runoffs can occur when warm rains fall on the snow pack. Silver Creek flows are controlled by Icehouse, Junction, Union Valley and Camino Divide Reservoirs. The flows of the South Fork of the American River are also controlled below the Silver Creek confluence by these same reservoirs, as well as by Caples and Silver Lake Reservoirs located higher in the basin, approximately 20 air miles upstream from Whale Rock in the South Fork of the American River canyon.

### **Beneficial Uses and Water Quality**

Water quality within the analysis area affects local beneficial uses, such as domestic water supplies, small-scale agriculture, and recreation. Downstream beneficial uses include cold water fisheries, recreation, reservoir storage, power generation, and domestic and municipal water supply. Waters supporting these beneficial uses are presumed to meet the Clean Water Act goals established by Congress. Although there are no designated municipal watersheds within the project area, the South Fork of the American River drains into Folsom Reservoir 30 air miles west of the project area. This reservoir is the principal water supply of the cities of Folsom, Roseville, Citrus Heights and Orangevale. Local domestic and municipal water supplies are derived from springs and tributaries to the South Fork of the American River. Hydroelectric power generation within the project area occurs at Jaybird powerhouse above Camino Divide Reservoir on Silver Creek, managed by the Sacramento Municipal Utilities District (SMUD). Specific beneficial uses by watershed are described in Appendix G. Additional details are available for review in the Cumulative Off-Site Watershed Effects Reports which are a part of the Whale Rock Planning Record. This additional information is available at the Pacific Ranger District and the Eldorado Forest Supervisor's Office.

### **Watershed Characteristics and Cumulative Watershed Effects**

Watershed disturbance is measured in terms of equivalent roaded acres (ERAs). The percent ERA is the sum of the ERAs in a watershed divided by total acres in the watershed. The disturbance level (%ERA) is compared to a threshold of concern (TOC), which is also measured as percent ERA. The TOC is established by looking at each watershed's natural sensitivity, measured as a natural sensitivity index (NSI). The measure of susceptibility to cumulative watershed effects (NSI) is a combination of geologic, geomorphic, hydrologic and climatic considerations. The TOC is an estimation of a watershed's natural ability to absorb land use impacts. The higher the NSI, the lower the TOC. The TOC does not represent the exact point at which cumulative watershed effects will occur; rather, it serves as a 'yellow flag' indicator of increasing susceptibility for significant adverse cumulative effects occurring with a watershed. Susceptibility of cumulative watershed effects generally increases from low to high as the level of land-disturbing activities increases towards or beyond the TOC.

The Natural Sensitivity Indices (NSI) of the affected watersheds in Whale Rock vary from moderate to very high. Hydrologic function of all seven watersheds has been, and continues to be, affected by past management activities. These past activities include

historic hydraulic mining (particularly along the South Fork of the American River), logging, grazing, road construction and development of impervious areas such as home sites. In addition, the residual effects of catastrophic fires continue to affect the hydrologic function of several of the watersheds within the project area.

In September of 1992, the Cleveland Wildfire burned approximately 22,500 acres (or approximately 12%) of land within the LSFAR basin. Four watersheds with portions within the Whale Rock analysis area (Riverton, Sunset, Round Tent Canyon and Little Silver) were partially within the burn area. Riverton Watershed was 50% burned and experienced high intensity burning on 35% of the area. The other three watersheds experienced burning on 6% or less of their acreage. However, less than 5 acres of Forest Service lands within the Whale Rock Analysis Area were burned in the Cleveland Fire. Monitoring of the watersheds after the winters of 1992-93 and 1993-94 indicated that the four burned watersheds experienced accelerated erosion where high and moderate intensity burning occurred. Minor slides, sloughing and gullyng have been evident within predicted amounts; there have been no major slides, debris flows or other significant events.

Cumulative Watershed Effects (CWE) analyses are complete for each watershed in the project area. These analyses were conducted using the USFS Region 5 model as amended by the Eldorado National Forest (Carlson and Christiansen 1993). All measurements are based on equivalent roaded acres (ERA). The existing ERA percentages in the following table display the CWE calculations. Copies of the analysis reports are included in the planning record and are available for review at the Pacific Ranger District Office in Pollock Pines or the Eldorado Forest Supervisor's Office in Placerville. Stream survey observations made in 1995 appear to adequately reflect the levels of risk which appear in the following table. This is further evidenced by the restoration opportunities that have been identified in each of the higher risk watersheds (Boyd 1995; Farley 1995).

<b>Table 4. Existing Condition of Affected Watersheds (CWE Analysis)</b>					
Watershed	Acres in Watershed	Established TOC (ERA %)	Existing ERA % (1994)	NSI	% Watershed in Project
Jaybird Canyon	1,652	14-16%	8.3%	49 (Moderate)	100
Pacific House	8,344	10-12%	5.2%	70 (Very High)	40
Lower Silver	4,188	10-12%	6.6%	283 (Very High)	50
Soldier Creek	3,491	12-14%	12.6%	57 (High)	100
Sunset	10,679	10-12%	8.0%	79 (Very High)	25
Riverton	10,920	10-12%	13.5%	102 (Very High)	21
Round Tent Canyon	2,400	12-14%	7.3%	60 (High)	100



A number of watershed improvement projects are currently underway or have recently occurred. In 1994 and 1995, a number of different field reviews were conducted within Soldier Creek Watershed. EA Environmental Engineering began a survey in 1994 to characterize overall watershed condition, but due to weather and funding this work was not completed. The Pacific District Timber Management Officer, a Forest geologist, and a Forest hydrologist made repeated visits to the North Fork of Soldier Creek and the upper reaches of the South Fork of Soldier Creek. These field reviews primarily focused on the presence of an old, abandoned road on Forest Service land that was contributing to channel instability and siltation problems in the South and North Forks of Soldier Creek. As a result of these field visits, funds collected from the Black Flag Salvage Timber Sale will be used to reshape and stabilize portions of the channel.

Rehabilitation plans have been developed for Soldier Creek Watershed (Farley 1995) and for Riverton Watershed (Boyd 1995) which address the potential for adverse CWEs in areas of known erosion or sedimentation in these two watersheds presently considered over threshold. Watershed improvement needs (WIN) in Soldier Creek include the obliteration of abandoned roads and landings (2.8 acres), improving road drainage including stabilizing stream crossings (3.0 acres), repairing a water hole and clearing of large woody debris jams (0.9 acres) in the creek. The Soldier Creek rehabilitation plan provides additional information regarding these identified watershed improvement needs.

In the Riverton Watershed, the majority of the projects identified in the rehabilitation plan fall outside of the Whale Rock project area, within the Cleveland Fire Area. Watershed improvement needs on Forest Service land within the Whale Rock Area include road and stream crossing stabilization work in two locations and the obliteration of 15 existing landings and three miles of skid roads (roughly 8 acres). In 1994, post-harvest ripping of selected landings and roads within the Riverton Watershed occurred as outlined in the Cleveland Fire EIS. The Riverton rehabilitation plan includes a further discussion of projects and associated jurisdictions outside of the Whale Rock Project Area.

Additional watershed improvement needs have been identified in Lower Silver, Jaybird, and Round Tent Watersheds. Within the Lower Silver Creek Watershed, identified WIN projects include obliteration of four landings and one mile of skid road (roughly 2.3 acres). In Jaybird Watershed, projects include obliteration of eleven landings within a streamside management zone (SMZ), along with two miles of skid road and one-third mile of system road (roughly 6.1 acres). In Round Tent Watershed, projects include obliteration of fourteen landings as well as one mile of skid road (approximately 5.6 acres). Pacific House Watershed projects include obliteration of nine landings within an SMZ and a mile of skid road (roughly 4 acres). Finally, twelve landings and one mile of skid road (approximately 5 acres) are proposed to be obliterated in the Sunset Watershed.

### Stream Classification and Channel Characteristics

Streams are classified based on stream size, season of flow, amount of flow, importance as a fishery or water source, as well as other characteristics (R5 FSH 2509.22). Stream classes within the project area range from Class I (largest, most important) to Class IV (ephemeral). The South Fork of the American River and portions of Silver Creek are Class I streams. The Lower Silver Watershed is also considered a Class II stream, as is the lower section of Sunset Watershed. Soldier Creek, Round Tent Canyon Creek, Jaybird Creek and Brockliss Creek are Class III streams. Soldier and Brockliss Creeks drain directly into the South Fork of the American River Canyon, while Jaybird and Round Tent are tributaries to Silver Creek. Silver Creek, in turn, flows into the South Fork of the American River; the confluence of Silver Creek with the South Fork marks the southwest project boundary. Table 5 summarizes the miles of stream class by watershed; class IV streams were unestimated.

<b>Table 5. Stream Class Mileage</b>			
<b>Watershed</b>	<b>I</b>	<b>II</b>	<b>III</b>
Jaybird	0.0	0.0	7.6
Pacific House	10.1	0.0	23.6
Riverton	7.7	0.0	37.1
Round Tent	0.0	0.0	12.1
Lower Silver Creek	0.0	6.7	15.8
Soldier Creek	0.0	2.4	16.9
Sunset	9.3	8.0	36.5

The tributary stream channels to the South Fork of the American River and Lower Silver Creek in the analysis area vary from fairly steep to very steep. These are the types of channels normally expected for the geomorphic conditions in the area. The channels are frequently incised, and the streambed substrate ranges from fines to bedrock. The steep portions of the incised inner gorge area are subject to landsliding, debris flow and soil erosion, which can contribute high levels of sediment to the adjacent stream channels. Inner gorge areas and steep canyon slopes are susceptible to destabilization from logging, road construction and especially catastrophic fire. Although no project activities are planned in the inner gorge, inner gorge acreage was calculated for each watershed within the project area. These totals are included in the assessment of each watershed's natural sensitivity as part of the CWE analysis. Additional information concerning the geomorphology of the affected watersheds is included in the CWE reports and supplements.



## **Wetlands and Floodplains**

A wetland is a legally defined term (Federal Register 1980; 1982) that applies to any area where the soil surface is inundated or saturated with water at a frequency or duration sufficient to support, and that does support under normal circumstances, a prevalence of vegetation typically adapted for life in saturated conditions (i.e., bogs, swamps, marshes, etc.). There are no large wetlands within or immediately adjacent to the project area. There are some small (less than 1/10 acre) wetlands in the form of springs or seeps within the project area. The largest named springs on public lands are Jay Bird Spring and Cedar Spring. Springs on private lands occur in the vicinity of Rice Cabin, Indian Hattie's, Spring Valley, White Meadows and McManus. Historically, most of these springs were perennial; however, over the last several decades most have tended to be seasonal.

Floodplains within the project area are very limited. Geomorphic features of most of the stream channels within the project area are, for the most part, moderately to well-confined. With the exception of a few roads there are few to no improvements or developments adjacent to any of the stream channels. Once again, peak flows in Lower Silver Creek and the South Fork of the American River are largely controlled by dams.

## **VEGETATION, BIODIVERSITY AND TIMBER**

Biodiversity has been defined as the variety of life forms, the ecological roles they perform, and the genetic diversity they contain (Wilcox 1984:640 cited in Murphy 1988:71). Maintenance of biological diversity is central to the management of sustainable ecosystems. The National Forest Management Act (1976) provides primary direction to the National Forests for the conservation of biodiversity (USDA Forest Service 1994). For purposes of this discussion, the abundance, age, size, density and distribution of conifer trees and stands are viewed in terms of their ecological significance. The growth, yield, and development of timber stands within the project area are discussed under the timber heading.

Ecosystem biodiversity occurs on a variety of spatial scales (microscopic, species, ecosystem, and landscape), and patterns of composition and structure are manifestations of complex relationships and underlying processes. Processes are the foundation of ecosystems and should be the focus of any approach to conserving biodiversity. The primary processes that influence landscape patterns are those that relate to abiotic factors (climate and geologic processes), and biotic factors (population dynamics and gene flow), the interactions of these factors, and disturbances such as fire or landslides (USDA Forest Service 1994).

Within ecosystems, many of the complex relationships between organisms are closely tied to or influenced by the vegetation component. In general, those areas that have the most diverse plant life have a greater number of habitats available for animals, and therefore, greater biodiversity than an area with a less diverse representation of plants.

The vegetation in different plant communities varies in both vertical and horizontal structure. Vertical structure is described by layers of understory, midstory and overstory. Horizontal structure refers to patchiness or fragmentation across the landscape. Generally, areas that are structurally diverse have more species diversity than areas that are more homogeneous, due to the greater number of habitats present (USDA Forest Service 1993).

A key assumption in maintaining biodiversity states that if processes are sustained within some proximity to what existed under "natural" conditions, then the dependent components and resulting structures will persist. Because much of the biodiversity in an area is microscopic and may be unknown (for example, genetic diversity or soil micro-organisms and insects) and because processes are difficult to monitor, vegetative components and structures must sometimes serve as proxies to processes (USDA Forest Service 1994). Therefore, a method for conserving those organisms about which we know very little is to conserve the vegetative communities that naturally occur in the area, with their diversity of seral stages, structures and species compositions (USDA Forest Service 1993).

Management designed to maintain key ecological elements within the natural ranges of variability that have occurred over hundreds or thousands of years is most likely to produce sustainable ecosystems. The concept of sustainability is rooted in ideas of environmental stability and predictability. Although landscape change is often dynamic and chaotic, it is assumed that if key ecological elements are within the range of conditions experienced and adapted to over evolutionary time, those conditions will sustain the ecosystem as a whole. Management designed to reproduce key influences upon ecosystems and processes within them is the most likely management approach to sustain ecosystem integrity and productivity (USDA Forest Service 1994).

There are a number of key ecological elements that define the composition, structure and processes of ecosystems (Manley et al 1995). Some elements, such as climate, weather and geological features, are essential ecosystem features that operate outside of human management or control. However, there are some ecological elements that have been affected by people over ecological or evolutionary time which are good candidates for analysis and monitoring. After a disturbance such as fire, insect damage or logging activities, plant communities undergo succession in species composition over time. Each consecutive seral stage varies as to the type and quantity of plant and animal species present. In general, forest biodiversity increases during early succession until trees form a closed canopy. As a closed canopy is formed, forest diversity declines to an intermediate level until features of the late mature stage appear and contribute to higher species diversity (USDA Forest Service 1993).

For purposes of this DEIS, the ecological elements of fire, vegetation mosaic and woody debris will be used to assess the effects of the proposed project upon the ecosystem. The vegetation mosaic is a key environmental indicator in determining habitat suitability for all biological species and individuals. Plant communities and seral stages can be used as direct and indirect measures of biological diversity and habitat suitability. The



vegetation mosaic influences the type and amount of woody debris and organic matter on the land which, in turn, influences soil productivity through protection and nutrient cycling. Vegetation influences aquatic systems through shading and input of nutrients and structural components. Vegetative density, fuels structure, and distribution are important factors in risk of disturbance by fire, insects, pathogens and storms. Mapping mosaic patterns and analyzing occurrence and distribution along with habitat inter-relationships allow assessment of habitat suitability and species viability (USDA Forest Service 1994).

This DEIS will use both a narrative description as well as two formal classification systems to describe the existing vegetation mosaic and the changes in acreage that would occur to that mosaic as a result of project implementation. The formal systems to be used are:

- 1) The R5 Timber Management Strata/CALVEG Designation System. This system is the standard system used to conduct timber management planning inventories in California. Dominant tree species associations, size class and density are the measured elements.
- 2) The Wildlife Habitat Relationships System (WHR). The WHR is a classification system which relates vegetation types to wildlife. Habitat Stage acreage will be the measured element. The WHR system is indicative of forest succession or seral type, and provides a bridge between various disciplines such as wildlife, range and forestry (Mayer and Laudenslayer 1988:9).

The following table (Table 6) explains the attributes and codes used to designate timber strata in the CALVEG system. Within the CALVEG system, for example, young growth might be characterized with M2G codes, and "old growth" or late successional stages with M4G codes. Most of the following discussion uses the CALVEG system. The section following the table describes the principal WHR types found in the Whale Rock area. The WHR system is used primarily in the wildlife and historical landscape sections.

<b>Table 6. Attributes and Codes Used in the Timber Strata/CALVEG System.</b>		
<b>Attribute</b>	<b>Code</b>	<b>Identification</b>
<b>Timber type</b>	M	Mixed-conifer
	P	Ponderosa pine
	R	Red fir
<b>Tree size-class<sup>1</sup></b>	2	<12 inches
	3	12-23.9 inches
	4	>24 inches
<b>Canopy closure</b>	P	Poor (0 - 39%)
	N	Normal (40 - 69%)
	G	Good (>70%)

<sup>1</sup> Mean diameter at breast height of dominant trees.

## **Description of Principal WHR Types of the Whale Rock Analysis Area**

(Mayer and Laudenslayer 1988)

The distribution of vegetative types within the Whale Rock analysis area have changed significantly in historic times as a result of wildfire suppression and exclusion (see the maps included in Appendix B). A discussion of the nature and distribution of these changes is included later in this chapter under the heading "Historical Landscape Description."

### Sierran Mixed Conifer (SMC)

**Structure:** Forested stands of conifer and hardwood species form closed, multilayered canopies with nearly 100 percent overlapping cover. These closed canopy stands can range from extensive to patchy depending on several factors such as slope, microclimate, and history of the area. Where openings do occur, shrubs are common in the understory.

**Composition:** Five conifers and one hardwood species are typical in this habitat type: white fir, Douglas-fir, ponderosa pine, sugar pine, incense cedar and California black oak.

**Distribution:** Within Whale Rock, SMC is located primarily on the slopes of canyons and drainages, particularly in Silver Creek, Jaybird, and Round Tent Canyons, and in minor portions of the South Fork of the American River. Some areas of SMC are also situated atop Telephone Ridge.

**Wildlife Considerations:** Variety in plant species composition provides diversity in cover and food available to wildlife; acorns, berries from shrubs such as deerbrush, and grasses and forbs provide forage. Sensitive species found in this habitat type can include spotted owl, Northern goshawk, fisher, and pine marten. Endangered species which often use this habitat type include the bald eagle and peregrine falcon.

### Ponderosa Pine (PPN)

**Structure:** Tree spacing in these stands can vary from open and patchy to extremely close. Typical overstory coverage may exceed 100 percent. Other conifers may be present, providing denser crowns than the pines, and thus creating habitat diversity.

**Composition:** Included in this habitat type are pure stands of ponderosa pine as well as stands of mixed species in which at least 50 percent of the canopy area is ponderosa pine.

**Distribution:** In the analysis area, PPN includes large areas atop Peavine, Telephone and Big Bend Ridges as well as areas in mid to upper slopes of the South Fork American River Canyon.

**Wildlife Considerations:** A mixture of early and late successional stages closely interspersed provides good general wildlife habitat. PPN is sometimes a transitional or migratory habitat for deer and can be extremely important to deer nutrition in holding areas (areas where deer congregate before moving to higher elevations). The Sierra Nevada red fox, a sensitive species, also uses this habitat.

#### Montane Hardwood-Conifer (MHC)

**Structure:** This habitat type includes both conifers and hardwoods. In order to be considered MHC, at least one-third of the trees must be conifer and one-third must be broadleaf species. This habitat is often composed of small pure stands of conifers interspersed with small pure stands of broadleaf trees. Typically, the upper canopy is composed of conifers to 200 feet in height, while the lower canopy is composed of broadleaf trees 30-100 feet tall. Little understory occurs under this dense bi-layered canopy.

**Composition:** Common species are ponderosa pine, Douglas-fir, incense cedar, canyon live oak, California black oak, tanoak, Pacific madrone, and other local species (species composition varies substantially among different geographic areas).

**Distribution:** MHC occurs on large portions of the south-facing slopes of the South Fork of the American River Canyon; portions of Silver Creek Canyon; south-facing slopes of Round Tent Canyon; and areas atop Big Bend Ridge in the vicinity of Jaybird Springs.

**Wildlife Considerations:** Canopy cover and understory vegetation are variable which makes the habitat suitable for a variety of species. Mature forests are valuable to cavity nesting birds. Acorn crops are an important source of food for many birds and mammals.

#### Montane Hardwood (MHW)

**Structure:** This habitat is typically composed of a pronounced hardwood tree layer, with an infrequent and poorly developed shrub layer. Tree heights tend to be uniform in mature stands but subordinate to any conifers present.

**Composition:** In the Sierra Nevada ranges, steep and rocky south slopes of major river canyons are often covered extensively by canyon live oak and scattered old-growth Douglas-fir. Other, higher elevation areas are typically composed of mixed conifer and California black oak. Lower elevational components are gray pine, knobcone pine, tanoak, Pacific madrone and scrubby California laurel.

**Distribution:** Portions of the Silver Creek Canyon include the MHW habitat type.

**Wildlife Considerations:** Wildlife species that use acorns as a food source are characteristic of this habitat, including jay, acorn woodpecker, gray squirrel, wild turkey, mountain quail, band-tailed pigeon, California ground squirrel, dusky-footed woodrat,



black bear and deer. Many amphibians and reptiles are found on the forest floor in this habitat zone.

#### Montane Chaparral (MCP)

**Structure:** This habitat is composed of brush species that can vary in height from low to tree-like (up to 10 feet). When it is mature it is often impenetrable by large mammals. Understory is typically absent.

**Composition:** This habitat is characterized by evergreen species, but deciduous/partially deciduous species may be present. The composition varies greatly with changes in elevation and other factors. The following species are common: whitethorn, poison oak, pinemat manzanita, whiteleaf and greenleaf manzanita, Sierra plum, bitter cherry, Fresno mat, Sierra chinquapin, silktassel, canyon live oak and buckthorn.

**Distribution:** In the analysis area, MCP is found on small portions of the mid-slopes of Silver Creek Canyon.

**Wildlife Considerations:** MCP is important as habitat for a wide variety of wildlife species. Many birds and a variety of rodents find a variety of habitat needs met here in its provision of seeds, fruits, insects, protection from predators and inclement weather. Birds also find an abundance of singing, roosting, and nesting sites. Shrubs are important to many mammals as shade during hot weather and shelter from wind and mild temperatures in the winter. Deer and other herbivores are closely associated with chaparral communities. Montane chaparral provides critical summer range foraging areas, escape cover and fawning habitat.

#### Montane Riparian (MRI)

**Structure:** The vegetation is quite variable and often structurally diverse. Usually, the montane riparian zone occurs as a narrow, often dense grove of broad-leaved, winter deciduous trees up to 100 feet tall with a sparse understory.

**Composition:** Characteristic species within the Whale Rock project area include alder, willow, Douglas-fir, horsetail, grasses, rushes, sedges, Pacific yew, nutmeg, blackberry, Sierra sweet bay, azalea, bigleaf maple and three species of dogwood.

**Distribution:** Within the project area, MRI occurs along all Class I-III drainages.

**Wildlife Considerations:** All riparian areas have an exceptionally high value for many wildlife species. Riparian areas provide water, thermal cover, migration corridors and diverse nesting and feeding opportunities. The shape of many riparian zones maximizes the development of edge which is highly productive for wildlife. The range of wildlife that uses the riparian habitat includes amphibians, reptiles, birds and mammals.

### Forest Inventory Acreage

Table 7 gives the estimated acres of timber strata on National Forest Lands within the Whale Rock analysis area using the CALVEG system, based upon a March, 1994, forest data base query.

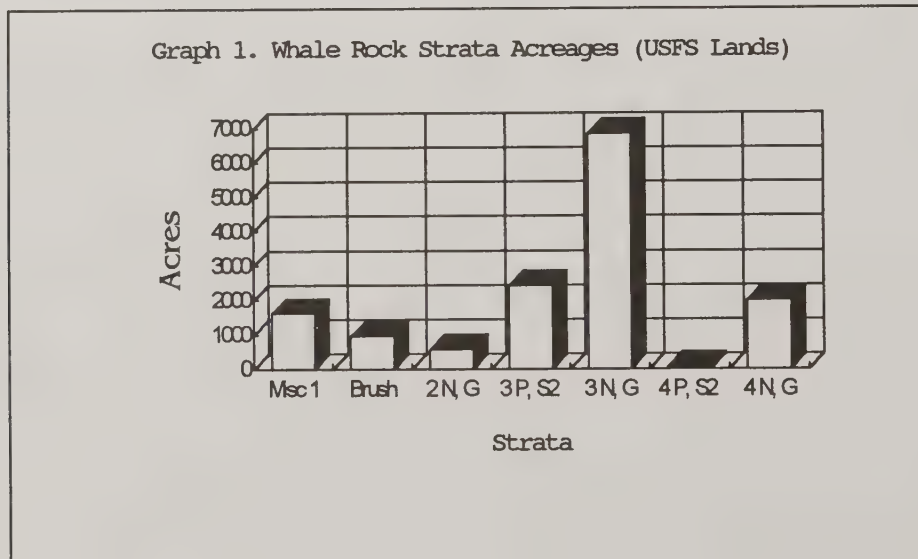
<b>Table 7. Whale Rock Strata Acreages (USFS Lands)</b>		
Strata	Acres	%
Misc. <sup>1</sup>	1,610	11.2
Brush	947	6.6
2 N, G	562	3.9
3 P, S <sup>2</sup>	2,423	16.8
3 N, G	6,837	47.3
4 P, S <sup>2</sup>	63	0.4
4 N, G	1,995	13.8
<b>Total</b>	<b>14,437</b>	<b>100.0</b>

<sup>1</sup> Includes young plantations, barren areas, grass, oak woodlands and water.

<sup>2</sup> "P,S" strata are combined into "P" strata for use in CASPO prescriptions;

"S" strata = 0-20% canopy closure.

The Whale Rock strata acreages given in Table 7 are represented in the following graph (Graph 1).



Also based upon a March, 1994, forest inventory data base query, Table 8 (below) displays the estimated acreages of timber strata on private lands within the Whale Rock analysis area.

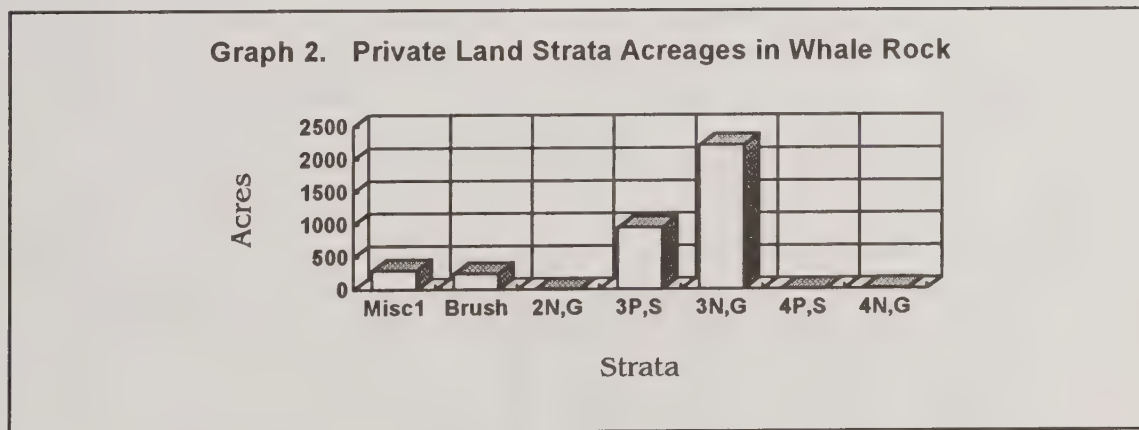
<b>Table 8. Private Land Strata Acreages in Whale Rock</b>		
<b>Strata</b>	<b>Acres</b>	<b>%</b>
Misc. <sup>1</sup>	290	7.9
Brush	245	6.6
2N,G	0	0.0
3P,S	945	25.6
3N,G	2,208	59.7
4P,S	0	0.0
4N,G	6	0.2
<b>Total</b>	<b>3,694</b>	<b>100.0</b>

<sup>1</sup> Includes young plantations, barren areas, grass, oak woodlands and water

<sup>2</sup> "P,S" strata are combined into "P" strata for use in CASPO prescriptions;

"S" strata = 0-20% canopy closure.

The data presented above is displayed below in Graph 2.



This combined data show that much of the Whale Rock area can be characterized as being in the mid seral stage, with the largest number of old growth acres occurring on National Forest lands.



### Species Composition

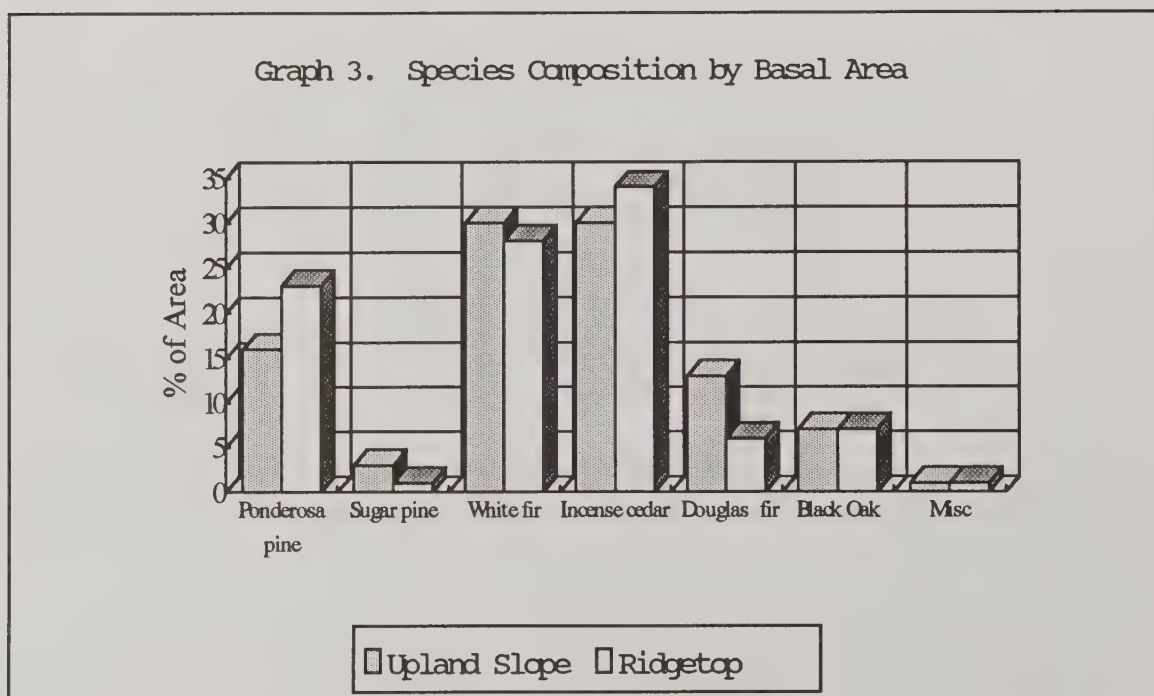
Species composition is discussed separately for natural stands and plantations.

#### Naturally Regenerated Stands

Sierra Nevada Mixed Conifer and Ponderosa Pine are the principal forest cover types within the Whale Rock area. The understory is dominated by dense, shade tolerant white fir and incense cedar saplings and small poles. Based upon approximately 3,000 acres of stand exams conducted within selected forested areas, species composition by basal area is as indicated in Table 9.

<b>Table 9. Species Composition by Basal Area</b>		
<b>Species</b>	<b>Existing Percent by Basal Area</b>	
	<b>Upland Slopes</b>	<b>Ridgetops</b>
Ponderosa pine	16	23
Sugar pine	3	1
White fir	30	28
Incense cedar	30	34
Douglas-fir	13	6
Black oak	7	7
Misc.	1	1
<b>Total</b>	<b>100</b>	<b>100</b>

The following graph displays the distribution of species presented in Table 9.



## Plantations

The existing plantations within the Whale Rock area were planted primarily to ponderosa pine, although the plantations established during the early 1960s consist of a mix of ponderosa pine and a Jeffrey/Coulter pine hybrid in some instances. Plantations established since the mid-1980s were commonly planted with a 30-50 percent Douglas-fir component. Some of the plantations were planted with a sugar pine component, but in most cases all of the sugar pine has succumbed to white pine blister rust. Most of the plantations have a minor component of white fir and/or incense cedar seedlings and saplings that have seeded in naturally from adjacent leave trees. Black oaks have been left in all plantations established since the mid-1980s.

### **Tree/Stand Age**

Within the project area, the average age of the natural stands is generally around 130 years, if the dense understory (which is approximately 30-80 years of age) is not considered. Scattered across the project area are many trees that exceed 300 years of age. Concentrations of these older trees are associated with riparian areas and areas where late seral forest conditions persist. There are approximately 1,400 acres of plantations within the project area. These were all established since 1960.

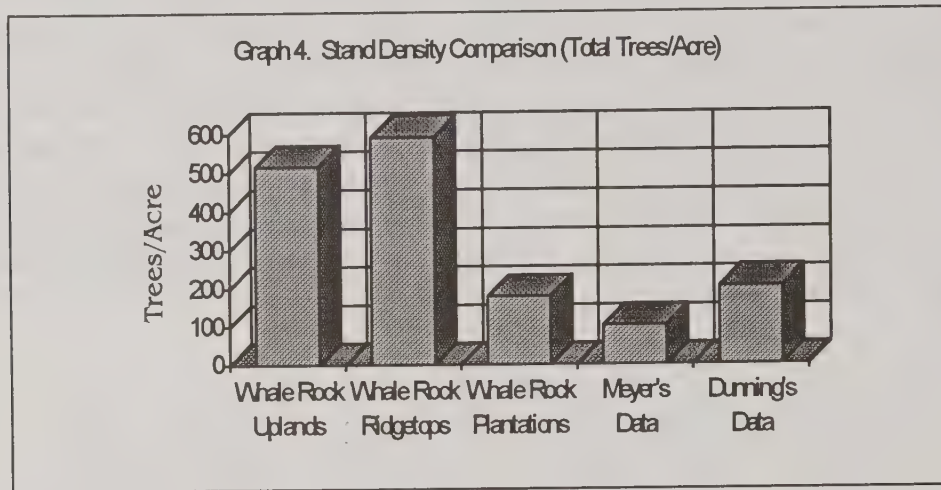
### **Stand Density**

Stand density is discussed here for both the naturally regenerated stands and the plantations. The average number of trees per acre is displayed in Table 10. For purposes of comparison, the average number of trees per acre is presented as determined for natural stands of Ponderosa pine (Meyer 1938) and Preliminary Yield Tables For Second Growth Stands in the California Pine Region (Dunning and Reineke 1933). The data from 1933 and 1938 provide one estimate of the Normal Range of Variability of the number of trees that were formerly present in similar timber stands. For the Whale Rock information, current data are derived from stand measurements. Data for the Whale Rock plantations correspond to planted trees (primarily ponderosa pine) and trees established by natural seeding (primarily white fir, incense cedar and lodgepole).

<b>Table 10. Stand Density Comparison (Total Trees Per Acre)</b>	
<b>Source</b>	<b>Trees</b>
Whale Rock Upland Slopes <sup>1</sup>	516
Whale Rock Ridgetops <sup>2</sup>	592
Whale Rock Plantations Planted Trees/Natural Seedlings <sup>3</sup>	178/496
Ponderosa Pine (Meyer)	102
Westside Young growth (Dunning/Reineke)	204

<sup>1,2,3</sup> Determined by stand exams.

The following displays graphically the information presented in the above table.



### Late Seral Forests

"Old-growth," "ancient forests," "late-successional forests," "late seral forests" and "late-seral forest habitat" are all terms that are often used interchangeably to describe older forests or forests that are in the most advanced stage of development. The term old-growth is often more restrictive than the terms late-seral and late-successional (Fites 1994). From a forest structure and ecological function standpoint, late successional forests are different from younger forests. For purposes of this DEIS, "late seral forests" will be defined as timber stands with an average tree diameter that is equal to or greater than 24 inches and a total crown density greater than 40 percent. These two criteria define timber stands that are designated as either 4N or 4G in timber inventory records. Late seral forests have the following general characteristics:

- 1) dominant and co-dominant tree component averages over 24" in diameter;
- 2) moderate to dense canopy closure; and
- 3) mid-elevation forests with a variety of species present.

On the other hand, "old-growth timber" stands are here defined to only encompass the 4G timber type, i.e., diameter equal to or greater than 24 inches, with a crown density greater than 70 percent.

### Occurrence

Management Practice #56 in the Eldorado LRMP provides direction on managing diversity for purposes of supporting populations of wildlife and plant species that are native to the area. Each seral stage shall have at least a 5% representation within the area of management.



It is estimated that approximately 9.5% of the total Eldorado Forest landbase for lower montane forests is in a late seral habitat condition (defined as timber strata 4G) (Fites et al. 1994). Using the data from the Eldorado Forest LRMP inventory, the Whale Rock project area contains 1,423 acres of 4G strata, or 10.0 percent. In addition, if the 4N strata is also considered as contributing to the amount of late seral habitat, the total 4N and 4G strata increases to 1,995 acres, or 13.8 percent.

For purposes of validation, data compiled in 1993 during the ongoing timber sale reconsideration process estimated the amount of late seral forest on the Eldorado by combined watershed (Fites et al. 1994). The Whale Rock project is located in portions of two of the combined watersheds. Using the percentage of each watershed occupied by the Whale Rock project, and assuming that the proportion of 4G strata that is within Whale Rock is proportionate to the amount of the combined watershed occupied by the Whale Rock project, an estimate of the amount of 4G strata within Whale Rock is 1,692 acres (or 11.7%) as indicated in Table 11.

<b>Table 11. Estimated Amount of 4G Strata in Whale Rock</b>			
<b>Combined Watershed # (Fites et al. 1994)</b>	<b>% of Combined Watershed in Whale Rock</b>	<b>Acres of 4G Strata within Watershed</b>	<b>4G Strata in Whale Rock (acres/percent)</b>
#16	51	2,473	1,261 (8.7%)
#17	21	2,052	431 (3.0%)
<b>Total</b>		<b>4,525</b>	<b>1,692 (11.7%)</b>

The 4G conditions tend to occur as smaller inclusions within the 3N or 3G forest matrix, except within Silver Creek, Jaybird Creek, and the spotted owl protected activity centers (PACs) and habitat areas (SOHAs) where relatively large, continuous blocks of 4G occur. The largest proportion of the 4G strata within the Whale Rock area occurs north of Peavine Ridge, and within the Silver Creek drainage.

#### Late Seral Fragmentation

As previously mentioned, the 4G strata tends to occur in scattered patches. Based on the Forest Inventory mapping, approximately one hundred 4G patches are located totally or partially within the Whale Rock project. These patches range in size from approximately 5 acres to 200 acres on the upland slopes and from 5 to 75 acres on the canyon walls. Average 4G patch size is 14 acres (1423 acres total in 100 patches).

#### Late Seral Connectivity

A visual assessment of connectivity shows that those portions of the perimeter of the Whale Rock project area located in the canyons of the South Fork of the American River and Silver Creek, have substantial corridors consisting of 4N and 4G stands. These

corridors are usually only interrupted by naturally occurring 3N or 3G stands. North of Peavine Ridge, where late seral conditions dominate within the project area, the 4N and 4G stands tend to be somewhat isolated, their continuity interrupted by 3N or 3G stands that have had their overstories harvested.

Riparian zones associated with Soldier Creek, Round Tent Creek and Jaybird Creek also provide tributary corridors consisting of a mixture of 3N,G and 4N,G stands.

### **Other Diversity Elements**

Other diversity elements discussed here include the lava caps, rust resistant sugar pine, oak woodlands, riparian areas, and timber. Each of these is discussed separately below.

#### Lava Caps

Exposed, rocky areas on the lava cap (or more accurately, the 'mud flow') within the Whale Rock area interrupt the conifer-covered landscape. A 'sub-community' plant association occurs on the thin, Ledmount soils of the lava cap. These lava cap habitats, varying from one to more than 100 acres, are located primarily upon the ridgetops and south aspects of Peavine, Telephone and Jaybird Ridges and their associated, secondary ridges with south-facing exposures. The harsh habitat of these areas usually permits less than 20% of the area to be occupied by shrubs or trees, yet there can be more than 150 species of herbaceous plants growing within a single opening.

The lava cap ridges are remnants of the Mehrten Formation volcanic mudflows that occurred during the Miocene era, leaving breccia caps upon the ridges. The fragile, erosive, yet fertile soils that developed here commonly provide habitat for the sensitive plant species Lomatium stebbinsii, Calochortus clavatus var. avius, and Navarretia prolifera ssp. lutea. Many species of the Liliaceae and Amaryllidaceae genera are perennials in these areas. Canyon live oaks may be present, but usually occupy no more than 3% of the area.

The plant community flowers in a six month sequence, beginning in March and continuing as late as August. The large number of herbaceous plants in these areas create a meadow-like appearance when the plants are flowering. Outside of the flowering season, the lava caps appear to be rocky, barren areas surrounded by chaparral.

#### Rust Resistant Sugar Pine

Sugar pine is a component of the mixed conifer stands, making up about five percent of the stocking. There are four sugar pine trees within the Whale Rock Analysis Area identified as genetically resistant to white pine blister rust. Numerous others are undergoing testing for resistance. The Peavine Ridge area has proven to have a higher than normal incidence of rust resistant sugar pine than the general forest area.

Approximately 60 acres adjacent to Peavine Ridge Road (11N63) have been designated as a Rust Resistant Seed Production Area. Within this area, some light thinning around individual sugar pine has been done to enhance seed production and collection of rust resistant seed.

### Oak Woodlands

Black oak is present across the majority of the project area. In a number of instances, young stands of black oak are the dominant tree species. Stand exams revealed that black oak basal areas of approximately 100 square feet per acre occur on approximately 200 acres of forested uplands. In addition, on the steep canyon walls of the South Fork of the American River and Silver Creek, canyon live oak and interior live oak are very common and in some instances are the dominant trees present.

### Riparian Areas

Numerous riparian areas are scattered throughout the Whale Rock area, with the highest concentration occurring north of Peavine Ridge. For the most part, the Whale Rock project area is quite dry, and most of the riparian areas are directly associated with perennial and intermittent streamcourses, such as the lower and upper reaches of Jaybird, Soldier and Round Tent Creeks. The South Fork of the American River and Silver Creek have sufficient flows to substantially affect the microclimate of the adjacent areas and thus influence both the plant and animal habitats on a larger scale. The vegetation types within these riparian areas are identical to those listed for WHR type Montane Riparian.

The width of the riparian areas varies from 10 to 150 feet. Essentially none of these are associated with any meadow development. Salvage, overstory removal, or sanitation harvesting has occurred in most of the areas that are accessible to either ground based or skyline logging equipment. Within the Round Tent and Soldier Creek drainages, previous clearcuts have encroached into the riparian zones.

In addition to streamcourse areas, riparian vegetation is associated with the scattered springs and seeps within the project area, such as Cedar, Jay Bird and Spring Valley springs. Though only Spring Valley Spring normally has surface water, the plant species associated with all of the springs include some of the same plants common in the streamcourse zones.

### Timber

Timber stands in the analysis area are predominantly mixed conifer that are typical of forests that presently occur in the 4,000 to 5,000 foot elevational range in the westside Sierra Nevada. The upland timber stands can be generally categorized as less than 130 years of age with an extremely dense, shade tolerant understory and a largely absent old-growth component. The overstory component in this upland zone may vary somewhat, but usually consists primarily of a mixture of ponderosa pine, white fir and



incense cedar; the understory is almost totally white fir and incense cedar. In drainages, the conifer age-classes tend to be older, more decadent and comprised of a more shade tolerant overstory (principally Douglas-fir and white fir). The understory in drainages and riparian areas tends to be more diverse in terms of species composition. Aspect plays an influencing role in terms of species composition: north aspects tend to have a larger Douglas-fir component, usually at the expense of ponderosa pine. However, the understories within the planning area do not vary significantly by aspect.

The total estimated National Forest timber inventory within the Whale Rock Project Area, based upon Eldorado LRMP averages, and averages derived from the 1993 stand exams conducted for the Whale Rock Project, are given in Table 12. The data from the stand exam inventory is more recent and more site specific. The information from the Forest Plan is presented for comparative value only.

<b>Table 12. Total Estimated National Forest Timber Inventory for Whale Rock</b>			
Forest Plan Data <sup>1</sup>			
Strata	Volume/acre (MBF)	Acres	Total Volume (MBF)
2 N, G	9.434	562	5,302
3 P, S	20.721	2,423	50,207
3 N, G	35.121	6,837	240,122
4 P, S	32.864	63	2,070
4 N, G	52.103	1,995	103,945
<b>Total</b>	—	<b>11,880</b>	<b>401,646</b> <b>(Avg=33.81/ac.)</b>
Stand Exam Data <sup>2</sup>			
2 N, G	14.600 <sup>3</sup>	562	8,205
3 P, S	12.600 <sup>4</sup>	2,423	230,530
3 N, G	27.200 <sup>5</sup>	6,837	185,966
4 P, S	32.864 <sup>6</sup>	63	2,070
4 N, G	47.950 <sup>7</sup>	1,995	95,660
<b>Total</b>	—	<b>11,880</b>	<b>322,431</b> <b>(Avg=27.14/ac.)</b>

<sup>1</sup>Based upon Forest Averages (LRMP 3-107).

<sup>2</sup>Based upon Data from Whale Rock Stand Exams.

<sup>3</sup>Varies from 9.9 MBF/ac. to 19.3 MBF/ac. Average=14.6 MBF/ac.

<sup>4</sup>Only 1 - 3P stand sampled.

<sup>5</sup>Varies from 8.8 MBF/ac. to 45.6 MBF/ac, average= 27.2 MBF/ac.

<sup>6</sup>No sample in this strata.

<sup>7</sup>Varies from 14.4 to 81.5 MBF/ac., Average= 47.950 MBF/ac.

The character of the existing timber stands has been greatly influenced by historical and recent management activities. The primary influencing activities are the limited size of most naturally occurring fires due to suppression activities, the presence of stand-replacing wildfires, timber harvests and, to a much lesser extent, disturbance associated with the gold mining era of the 1800s. The exclusion of natural fires has favored the

shade tolerant species of white fir and incense cedar. Land disturbances associated with the gold mining favored the natural development of timber stands dominated by light-demanding ponderosa pine trees that are now approximately 150 years of age. Plantations associated with salvage of trees killed by wildfire or insects and with routine timber harvests are dominated by relatively uniformly spaced, planted ponderosa pine.

Timber management activities in the area date back to the 1930s and include approximately 700 acres of heavy selection harvesting encircling the old Blair Mill site in the South Fork American River Canyon, and single tree selection throughout the remaining area in the 1940s and 1950s. In the mid to late 1970s, a considerable amount of overstory removal harvests occurred that tended to dramatically reduce the numbers and distribution of large overstory trees, typically ponderosa and sugar pine.

Within the analysis area are 6,301 acres of the 1959 Ice House Wildfire, which resulted in the planting of ponderosa pine on 351 acres of federal lands in 1960 and 1961. Approximately 1,090 acres of plantations were established from 1965 to 1993 after routine and salvage harvests on Forest Service managed lands. These plantations are primarily dominated by ponderosa pine. In addition, timber harvests on private land have resulted in the establishment of numerous ponderosa pine plantations from one to 35 years of age.

Tree mortality caused by insect epidemics and drought have been a regular feature of the analysis area for the last two decades. In 1976-1978, extensive drought-related tree mortality occurred with tree losses predominantly confined to the large old-growth ponderosa and sugar pine. In the 1987-1994 drought, heavy levels of mortality occurred in the dense white fir stands that were approximately 75 to 100 years of age.

During the summers of 1993 and 1994, extensive stand exam inventories were conducted throughout the planning area. Though a considerable amount of variation exists, the natural stands average 235 square feet of basal area per acre in live trees, with individual stands ranging from 128 to 322 square feet. All areas include substantial numbers of suppressed and intermediate crown class saplings, poles and young sawtimber-sized trees. The stand exams validated what was obvious from field observation, i.e., the understory in many of these stands consists of dense, unnatural thickets of incense cedar and white fir saplings and poles.

The Ice House Fire era plantations were also extensively examined in 1993. These stands averaged 127 square feet of basal area per acre of plantation trees with a range from 87 to 186 square feet. These plantations are dense and crowded, with crowns touching. The basal area variation is due to the scattered and clumpy nature of some of the stands. The average board foot volume per acre in the plantations is about 12 MBF. Understory vegetation includes bearclover and dense deerbrush.

## SENSITIVE PLANTS

The botanical resources of the Whale Rock area are fairly well known. Forest Service botanical surveys have been conducted in the area since 1978, although many of these were cursory inspections or were limited to specific harvest units. Since 1990, non-site-specific surveys within the Peavine and Jaybird Compartments have been conducted to facilitate salvage operations. These surveys focused on areas of insect-killed trees, or on potential habitat near such trees. Such surveys have significantly increased botanical knowledge of the area and have resulted in the generation of plant inventory lists for roughly 45% of the ground. The majority of unsurveyed ground is located in the steep inner canyons; of this, only 25% is estimated to contain potentially suitable habitat for sensitive plants. Little botanical survey data exists for private lands within the analysis area.

No Federal proposed, threatened or endangered plant species are known to exist in the analysis area (USDI Fish and Wildlife Service Case No. 1-1-94-SP-1628). Four plants determined to be sensitive by Forest Service Region 5 have been found in the area. Sensitive plants are defined as those species identified by the Regional Forester for which population viability is a concern. In Whale Rock, these include the Pleasant Valley mariposa lily (Calochortus clavatus var. avius), yellow bur navarretia (Navarretia prolifera ssp. lutea), saw-toothed lewisia (Lewisia serrata) and Stebbins' phacelia (Phacelia stebbinsii). One additional plant, Stebbins' lomatium (Lomatium stebbinsii), is listed on the Sensitive Plant list. There are no known locations for Stebbins' lomatium on the Eldorado, although the Whale Rock area does contain suitable habitat. Surveys for this species have not been done, because the season of flowering occurs during the time of the year that lingering snowpack on the roads makes the habitat inaccessible.

Three Forest Special Interest plants, the woolly violet (Viola tomentosa), Pacific yew (Taxus brevifolia) and Sierra sweet bay (Myrica hartwegii), are known to exist in the analysis area. Special Interest species make up a Forest Watch List of plants that, although not currently rare, may become so in the future (for instance, the discovery in 1991 of the cancer-fighting drug taxol in yew bark has caused renewed interest and possible threat from illegal collecting in this species).

### Range, Distribution and Habitat of Sensitive Species in Whale Rock

The range, distribution and habitat requirements for the four listed sensitive plants provide a context for evaluating potential effects to each of these species. These are outlined below. Additional information on sensitive plant species can be found in Appendix E.

#### Pleasant Valley Mariposa Lily

There are 16 known occurrences of Pleasant Valley mariposa lily in the analysis area, and much of the project area includes small intrusions of suitable habitat for this plant. This plant is endemic to the Eldorado and adjoining private lands in the area between



Union Valley Reservoir and the North Fork of the Mokelumne River and is currently known to occur at 125 locations within this 420 square mile area. Of these 125 occurrences, 12 are located on private lands, 4 on both private and Forest Service lands, and the remaining 109 entirely on federal lands.

New occurrences continue to be discovered, primarily by Forest Service field personnel (e.g., 23 new occurrences were discovered in the Cleveland Fire area during the 1993 field season), although discoveries in recent years have not substantially increased the known range of the species. Historical accounts include a report of this lily from Mariposa County, but the precise identity of the plants at this location have never been independently confirmed (Farwig 1991).

Suitable habitat for this plant is based on an analysis of the data compiled from the records for all 125 known occurrences of Pleasant Valley mariposa lily. Suitable habitat consists of openings in mixed conifer and ponderosa pine forests, on lower to mid- to upper slopes and spurs with southerly aspects, at elevations of 2,800 to 5,600 feet. These openings typically occur on shallow soils with surface rocks and cobbles. Common plant associates include ponderosa pine, incense cedar, California black oak, canyon live oak, manzanita and bear clover. The canopy cover provided by these trees and shrubs is usually less than 50 percent. The presence of Pleasant Valley mariposa lily in open stands of conifers may indicate an intolerance of deep shade and/or thick duff. Fire appears to be a key habitat component, as evidence of fire scarred trees and logs is apparent at the majority of occurrences.

The habitat described above is naturally patchy in distribution and occurs in discrete units of 1 to 40 acres, separated by gaps of unsuitable habitat that vary in width from 1/8 mile to 4 or more miles. Aggregates of occurrences are found along east-west trending ridges that possess numerous south-facing spurs. Dense stands of ponderosa pine or mixed-conifer forest are usually present on the deeper soils located between islands of suitable habitat. Natural disturbances such as fire and wind-throw may provide openings in the forest that are suitable for at least temporary occupancy by Pleasant Valley mariposa lily. These temporary openings in areas otherwise unsuitable for the species may provide dispersal corridors by providing opportunities for short-lived colonies of plants to produce viable seed. This seed might then be disseminated to suitable habitats otherwise too distant from other long-lived occurrences.

#### Yellow Bur Navarretia

There are 21 known occurrences of yellow bur navarretia in the analysis area, and many areas of the project have habitat suitable for this plant. Yellow bur navarretia is found at elevations of 2,420 feet to 5,000 feet on gentle slopes with south to west aspects. Often this plant is found accompanying the Pleasant Valley tulip in open rocky areas of thin volcanic soils. These conditions occur throughout the central portions of the project area, particularly atop the major ridges of Peavine and Telephone Ridges. The plants typically flower from mid-May to mid-June.

Yellow bur navarretia is a highly localized subspecies that is restricted to a narrow east-west band 18 miles long and 8 miles wide centered around the town of Camino, in El Dorado County, with over 40% of the known occurrences found within three miles of this town (Eldorado National Forest 1985). Within this 144 square mile area, there are 80 documented occurrences of this annual herb. About half of these occurrences are located on federal land, the remainder on private lands.

The following description of habitat suitable for yellow bur navarretia is based on information contained in the Species Management Guide for Navarretia prolifera ssp. lutea (Eldorado National Forest 1985). All of the occurrences of yellow bur navarretia occur in openings in mixed conifer forest dominated by ponderosa pine, incense cedar, sugar pine and California black oak. Common understory and herbs associated with the occurrences typically include manzanita (Arctostaphylos spp.), buckbrush (Ceanothus cuneatus), hill lotus (Lotus humistratus), red brome (Bromus rubens), bicolored monkeyflower (Mimulus bicolor), mountain pretty face (Triteleia ixiodes ssp. anilina), and silver hairgrass (Aira caryophyllea). The non-forested openings where yellow bur navarretia occurs are either natural openings that result from thin soils or are due to human disturbances such as logging activities, road building or housing development. The majority of occurrences are found on the Ledmount soil series, a very shallow, cobbly sandy loam, underlain by hard volcanic breccia. This soil type is usually found on ridgetops and upper slopes in association with exposed lava caps. No plants have been found in pine needle or oak leaf duff.

The preferred habitat type for this plant is on or near rocky ridgelines, saddles or eroding ephemeral drainages, with thin Ledmount soils that support very sparse vegetative cover. On disturbed sites, displaced vegetation may return and reduce the suitability of the site to support yellow bur navarretia, resulting in the decline in numbers and area occupied by yellow bur navarretia and its possible elimination from the site.

#### Saw-Toothed Lewisia

Saw-toothed lewisia is endemic to the American River watershed, ranging from several scattered locations on the Tahoe National Forest to eleven locations on the Eldorado National Forest between the South and Middle Forks of the American River. Of the eleven known occurrences of L. serrata on the Eldorado National Forest, only two occurrences have been documented on the Pacific Ranger District, and one of these occurrences has been destroyed by illegal plant collecting. The one that remains is within the boundaries of Whale Rock, located in the steep rocky gorge of Silver Creek. No management activities are planned within this area.

The factors responsible for the limited distribution of saw-toothed lewisia have not been identified. Relatively high humidity is often listed as a key habitat attribute, due to the frequent presence of the species in the 'mist zone' of waterfalls. Habitat for this species is expected throughout the Silver Creek Canyon, which has not been surveyed.



### Stebbins' Phacelia

Eight occurrences of Stebbins' Phacelia are found within the rocky inner gorge of Silver Creek, 2 of which are in the analysis area, but because of the nature of the inner gorge, no management activities will take place near either occurrence. Habitat for Stebbins' Phacelia consists of dry, open, rocky areas on moderate to steep slopes, usually in association with bedrock outcrops, ledges or slopes with rubble or talus. This perennial herb is found at elevations between 2,000 and 6,800 feet, in areas where precipitation averages 57 to 63 inches a year. The distribution of Stebbins' Phacelia is not strongly correlated with aspect, though southerly aspects are more commonly observed than northerly aspects. This species is found on a wide variety of soil types, with all Eldorado National Forest occurrences located on soils derived from metasedimentary rocks.

The factors responsible for the limited distribution of Stebbins' Phacelia have not been identified. A description of the habitat characteristics needed to ensure its viability has not been developed, due to the lack of data on the demographics of its occurrence, and the absence of models from which to estimate the minimum numbers of plants and occurrences needed to sustain viability in the species.

### **Range, Distribution and Habitat of Special Interest Species in Whale Rock**

The range, distribution and habitat requirements for the three Special Interest species known to be located in Whale Rock also provide a context for evaluating potential effects to each of these species.

#### Sierra Sweet Bay

Sierra sweet bay is a low shrub that occurs in habitats associated with edges of rivers and streams at elevations from 1,000 to 5,000 feet. The riparian vegetation within the mixed conifer forest typically provides the dense canopy favored by this species. The present range for Sierra sweet bay consists of the west base of the Sierra Nevada Mountains from Yuba to Fresno counties. Present knowledge of the distribution of suitable habitat within the South Fork of the American River and its tributaries, coupled with the competitive nature of this species, make it likely that Sierra sweet bay is well distributed in the perennial riparian areas of the project.

#### Woolly violet

Woolly violet habitat is located between 5,000 and 6,500 feet on dry soils within openings usually in Ponderosa pine forests where competing vegetation is lacking. This perennial herb appears sensitive to soil disturbance, although it has been observed to persist within intensively managed conifer plantations and other disturbed sites. Woolly violet is sparsely distributed from Plumas County to El Dorado County.



### Pacific Yew

Pacific yew habitat can be found within mixed conifer forests where moist conditions prevail. Pacific yew typically occurs as an understory dominant or codominant species within the riparian zone below 7,000 feet, where it is primarily confined to canyon bottoms and the lower third of north-facing slopes. This plant species grows in a wide range of soil types, preferring deep, moist, rich soils, but also growing on shallower soils. The range for Pacific yew extends from the coastal area of extreme southeastern Alaska to central California, and as far inland as western Montana.

## **FISH AND WILDLIFE**

In general, habitat quality is moderate to poor for most species of concern occurring within the project area. Natural stands in the project area are comprised primarily of dense canopied ponderosa pine and mixed conifer. Among these natural stands are plantations resulting from both the 1959 Ice House Fire and from past timber management activities. Sierra Mixed Conifer is generally concentrated in drainages with either Ponderosa Pine or Montane Hardwood Conifer (WHR types) near ridgetops. Also occurring in patches throughout the area are pure stands of black oak and mature to overmature brush fields containing mostly manzanita, deerbrush, buckbrush and whitethorn.

The following section is divided into discussions regarding species overview, threatened species, proposed threatened species, sensitive species, management indicator species and fisheries. Further information regarding wildlife is included in Appendix B.

### **Species Overview**

The U.S. Fish and Wildlife Service was contacted for information on threatened, endangered or proposed listed wildlife species pursuant to Section 7 (c) of the Endangered Species Act. The agency responded January 18, 1996, (Case No. 1-1-96-SP-0291) and listed the peregrine falcon as an endangered species that could occur in the area. Two proposed threatened species, the California red-legged frog and the Sacramento splittail, and three threatened species, the valley elderberry longhorn beetle, the Delta smelt and bald eagle, are also considered to potentially occur within the project area.

There are also eight sensitive species that are identified for the Eldorado National Forest, including California spotted owl, northern goshawk, great grey owl, willow flycatcher, marten, fisher, Sierra Nevada red fox and northwestern pond turtle. The Eldorado LRMP identifies ten management indicator species (MIS) that are used in the analysis and in monitoring of forest activities. They include peregrine falcon, bald eagle, willow flycatcher, spotted owl, goshawk, deer, black bear, mountain quail, cavity nesting birds and trout (LRMP 2-14).

A Biological Evaluation was completed for this project (Appendix B) to evaluate potential effects on federally listed threatened, endangered and proposed species, and on Forest Service sensitive species. The biological evaluation determined that the marten, great grey owl, Sierra Nevada red fox, bald eagle, peregrine falcon, Sacramento splittail and Delta smelt lack habitat within the Whale Rock area. In addition, an analysis for MIS species was completed.

### **Threatened Species**

#### Valley Elderberry Longhorn Beetle

There have been no recorded sightings of longhorn beetles in the Eldorado National Forest. Suitable habitat includes riparian corridors at or below 3,000 feet that contain elderberry (*Sambucus* spp). Habitat in the Whale Rock area would be located in drainages along the South Fork of the American River and Silver Creek Canyons.

### **Proposed Threatened Species**

#### California Red-legged Frog

There are no known occurrences of this species on the Eldorado. It is possible that this species has been eradicated from the Forest. Potential habitat occurs around year-round pools in ponds and intermittent or permanent streams that are heavily associated with riparian vegetation below 4,500 feet elevation. Individuals have been found using small mammal burrows and moist leaf litter up to 85 feet from streams. Within the Whale Rock project area, suitable habitat is expected along major drainages of Jaybird Canyon, Round Tent Canyon, Soldier Creek, Silver Creek and the South Fork of the American River Canyon.

### **Sensitive Species**

#### California Spotted Owl

The Regional Forester has adopted interim guidelines for managing timber and fuels resources for Sierra Nevada forests in Region 5; these have been amended to the Eldorado LRMP. The guidelines are documented in the California Spotted Owl Sierran Province Interim Guidelines Environmental Assessment and Decision notice of January, 1993. The guidelines direct that protected activity centers (PACs) be established around known owl sites and define 'Selected' and 'Other' timber strata for management purposes (see CASPO Guidelines 1993).

Limitations and requirements for harvest and burning activities within defined areas are established in the guidelines. The most restrictive limitations apply to PACs where no

harvest activity is permitted, only light underburning to reduce fuel loading. Activities in Selected Strata are less limited than in PACs, but more limited than in Other strata. In both strata, harvest intensity and size of trees that may be considered for removal is limited. In either case, stand management prescriptions restrict the removal of live trees 30 inches d.b.h. and larger. In addition, the Interim Guidelines encourage "management experiments that test predictions and assumptions in management plans" (USDA 1993a:A-2) under an Adaptive Management Strategy (Adaptive Management is employed in Alternative C). These guidelines allow for the use of other management prescriptions where it is believed necessary to better protect the owl.

The project area has been surveyed on a regular basis for California spotted owl from 1986 to present. Currently, there are eight PACs located within the Whale Rock project area. Of these, ED-036 and ED-040 have had nesting status established in the past; ED-042 and ED-206 have their nests located on private land; ED-069 is a replacement PAC for a territory that was burned in the Cleveland Fire; and ED-051, ED-053, and ED-216 have had only pair status established.

Protected activity centers are generally found in the main drainages located within the project area such as Jaybird Canyon and Round Tent Canyon. Habitat found in these areas include Sierran Mixed Conifer with an understory of broad-leaved, deciduous trees such as alder, dogwood and willow. Within some of the PACs, are stands with a dense understory of young incense cedar and white fir. These areas present a hindrance to the foraging efforts of spotted owls. They are also at an increased risk of stand-replacing fires due to the heavy fuel loads and ladder fuels.

#### Northern Goshawk

There are two northern goshawk management areas (GMAs) located within the project boundary (GMA 501 and GMA 502). These areas were surveyed for goshawks in 1992 and 1993 with no response. All system roads in the project area were surveyed for goshawks in 1994 and again in 1995; these surveys resulted in several new detections. Based on these detections, four new GMAs have been proposed to be added to the Forest network (see Appendix B for details). Habitat is mostly concentrated in drainages of Sierran Mixed Conifer. Stands with a dense understory provide limited foraging for goshawks as they require spacing beneath the canopy for maneuverability.

#### Northwestern Pond Turtle

This species has been found on the Eldorado National Forest and is suspected to occur within the South Fork of the American River and the South Fork of Silver Creek. It may also occur within various springs and water holes scattered throughout the project area. Habitat requirements include the presence of riparian vegetation and basking sites in ponds and pools.



### Fisher

There have been no documented sightings of fisher within the project area. There are designated fisher travel corridors along the American River and Silver Creek canyons. The west end of the project area near these canyons, including areas along Soldier Creek, Round Tent and Jaybird drainages, is designated as a fisher use area. The remainder of the project area is not considered to be suitable habitat for fisher due to the high road densities, private residences and habitat fragmentation from both private land holdings and past timber management activities.

## **Management Indicator Species**

### Mule Deer

The project area from the South Fork of the American River to Peavine Ridge is within the winter range and critical winter range for the Pacific Deer Herd. Also included within the project area is a holding area (an area where deer concentrate during a major migration) and a major migration corridor. In 1992, the Cleveland Fire burned approximately 13% of the critical winter range for the herd and also the major migration corridor leading to summer range and fawning areas. Habitat found within the project area is considered medium quality due to the overmature brushfields and also because dense thickets of understory impede movement of deer through the area. In addition, a thick duff layer has accumulated due to the lack of fire in the area. This precludes the growth of grass and forbs which are important for forage.

### Mountain Quail

Mountain quail occur throughout the project area. The area is currently providing medium to high quality habitat due to the availability of brush and water, acorns as winter food, and steep slopes with escape cover.

### Black Bear

Black bear sightings have been reported throughout the Whale Rock project area. Oak and brush present in the area provide for fall and winter forage. Road densities and dense understories limit the quality of the habitat to medium.

### Cavity Nesting Birds

The project area is currently providing moderate habitat quality for cavity nesting birds. Snag levels are currently meeting or exceeding pre-CASPO LRMP levels throughout the project area. Conifer stands intermixed with brush and hardwoods provide a variety of foraging opportunities for all cavity nesting species.

## **Fisheries**

Class 1 and 2 streams within the Pacific District, including the South Fork of the American River and Silver Creek, generally support good populations of sport fish. Class 3 streams are perennial for the most part, and many of these support sport fish populations, or provide waterflow to downstream fisheries. Class 4 streams are characterized by ephemeral flow and do not support fish populations, but can contribute significant seasonal water flow to downstream fisheries. All stream classes are found within the Whale Rock area.

The major sport fish species in the streams are rainbow, brown and brook trout. All streams are composed entirely of naturally reproducing populations of resident fish, with the exception of the South Fork American River, which is stocked with rainbow trout. There are no federal or state listed threatened, endangered or sensitive fish species in the project area.

## **SNAGS AND DOWN LOGS**

The 1989 LRMP identified minimum levels of snags (standing dead trees) and down logs that varied by Management Area. In general, snag levels for the Whale Rock analysis area are designated to average about 0.7 snags per acre of various sizes to meet the 1989 LRMP guidelines. For most of the analysis area, the 1989 Plan did not specify guidelines for down logs.

In 1993, the LRMP was amended by a Regional Forester's Decision Notice which adopted the CASPO management recommendations. The CASPO guidelines specify that snags greater than 30-inch d.b.h. will be retained, to a maximum of eight snags per acre, within cut units or stands. If the snags greater than 30-inch d.b.h. total less than 20 square feet basal area, additional snags will be retained until either 8 snags per acre or 20 square feet basal area is achieved. The additional snags will be retained starting with the largest snags available. The CASPO recommendations specify that downed log levels greater than 11-inch d.b.h. will average at least 10 to 15 tons per acre over a cut unit.

During the summer of 1994, stand exams were conducted on 2,200 acres of natural stands within the analysis area. Variable radius and fixed radius plots were used in the sampling process. Approximately one sample plot was taken for each 5 acres sampled. Basal area and number of snags per acre were measured. Down logs were also measured in tons per acre and number per acre. The results of the survey for snags and down logs are displayed in the following table.

<b>Table 13. Stand Exam 1994 Snag and Down Log Survey Results</b>				
<b>Number of Snags/Acre and (Basal Area/Acre)</b>				
<b>Area</b>	<b>Acres</b>	<b>1" - 14.9"</b>	<b>15" +</b>	<b>Total</b>
Whale Rock Project	2,200	unestimated	14 (18 ft <sup>2</sup> )	14 (18 ft <sup>2</sup> )
<b>Down logs larger than 15"</b>				
<b>Area</b>	<b>Acres</b>	<b>Number/Acre</b>		<b>Tons/Acre</b>
Whale Rock Project	2,200	12		24

The extensive stand exam surveys of 1994 indicate that snag numbers (14/acre) substantially exceed minimum CASPO guidelines of 8 per acre. The basal area level of 18 ft<sup>2</sup>/acre does not exceed the CASPO guideline of 20 ft<sup>2</sup>/acre. The CASPO guidelines specify that neither the 8 snags per acre nor the 20 ft<sup>2</sup>/acre basal area level need be exceeded.

In May of 1994, a 100% snag and down log survey was conducted on a 160 acre block of land above the old Blair Bridge site. The area was selected for surveying because of a 15 year history of understory burning that has been conducted as part of the Pacific Ranger District prescribed burning program. Three prescribed burns have occurred in this area. The area is heavy to ponderosa pine with a bear clover ground cover. Only minor salvage harvests have occurred in this area since 1987. The results of the survey are displayed in the following Table.

<b>Table 14. Prescribed Burn 1994 Snag and Down Log Survey Results</b>					
<b>Number of Snags/Acre and (Basal Area/Acre)</b>					
<b>Area</b>	<b>Acres</b>	<b>0.1" - 15"</b>	<b>15.1" - 23.9"</b>	<b>24"</b>	<b>Total</b>
Blair Bridge	160	0 (0 ft <sup>2</sup> )	0.1 (0.1 ft <sup>2</sup> )	0.1 (0.4 ft <sup>2</sup> )	0.2 (0.5 ft <sup>2</sup> )
<b>Number of Down Logs/Acre</b>					
<b>Area</b>	<b>Acres</b>	<b>10" - 15"</b>	<b>16" - 23"</b>	<b>24" +</b>	<b>Total</b>
Blair Bridge	160	0.0	0.1	0.0	0.1

Since the stand exam surveys of 1994 were the most recent surveys within the analysis area and the most intensive and extensive, the data from these surveys most accurately depict the current status of snags and down logs within the project area. Fourteen snags per acre with diameters greater than 15 inches exceeds the minimum CASPO guidelines by 75 percent. Twelve down logs (24 tons per acre) exceeds the minimum CASPO level of 10 to 15 tons per acre by 100 percent. It should be remembered that the CASPO guidelines require snag and down log levels as averaged over cut units or stands, and not the entire project areas.

The 1994 survey within the prescribed burn area offers valuable insights concerning the number of snags and down logs that may have been present within many of the timber stands similarly situated on south or west aspects prior to Euroamerican influence. The



0.2 snags per acre and the 0.52 ft<sup>2</sup>/acre basal area may be very close to the snag numbers that would have been present during pre-European fire regimes. Although the data was acquired from a rather small area, it appears to be a reasonable estimate of the snag numbers characteristic of the historical range of variability.

## **FIRE AND FUELS**

In September of 1992, the Cleveland Fire began on south-facing slopes by the Riverton bridge over the South Fork of the American River. Six years of drought, hazardous fuel loads in 35-year-old plantations from the previous Ice House fire, and strong winds helped the fire spread rapidly. Three days later, the Cleveland Fire had consumed more than 22,000 acres of forest. Much of the area burned with very high intensities; flame lengths of 200 feet were common in the first few days of the fire and spot fires occurred as far as two miles from the main fire. Rain, wind shifts, and the presence of Union Valley Reservoir at the head of the burning front helped contain the spread of this fire, but not before the expenditure of \$18,000,000 for fire suppression activities. Forty-one structures were lost, including numerous private residences. More tragically, two pilots lost their lives when their airtanker crashed while they were fighting the fire.

The environmental conditions on the west end of the Pacific District in the Whale Rock analysis area are nearly identical to those found in the adjacent Cleveland Fire area before the burn. Slopes vary from nearly flat lava cap ridge tops to more than 70% in the canyon walls of Silver Creek and the South Fork of the American River, with the large majority of the slopes facing south. Vegetation types range from mixed conifer in the upper elevations to ponderosa pine, incense cedar, and black oak at the lower elevations. Dense stands tend to have a thick understory of incense cedar or white fir and a high fuel loading. Bear clover, whiteleaf and greenleaf manzanita, and deerbrush tend to grow in openings. Canyon live oak is prevalent at the lower elevations on rocky sites.

A fire history was conducted just east of the project area in 1993 (Gethen 1993). This study found that between 1768 and 1992 (a 224 year period), the average return frequency of fire was 8.6 years. The fire regime in this area was one of frequent low- to moderate-intensity ground fires. These lower-intensity fires removed ground fuels and eliminated fuel ladders, encouraging natural regeneration of pine with less understory crowding. Thus, the periodic fires maintained an uneven-aged mosaic of even-aged groups of trees dominated by pine.

Since 1958, there have been 43 forest fires in the Whale Rock Project Area (see Figure 13), which have burned a total of 7,221 acres (or more than one third of the entire project area). Of these, 28 were person-caused (65%) and 15 were caused by lightning (35%; or one lightning-ignited fire every 2.4 years). Seven of the 28 fires exceeded five acres in size, with only one of the seven caused by lightning. The burn rotation (the interval at which each acre will burn in years) for the Whale Rock area is now 90 years. By contrast, the burn rotation for the Eldorado National Forest is 447 years. Since 1958,

WHALE ROCK FOREST HEALTH  
MULTI-RESOURCE PROJECT  
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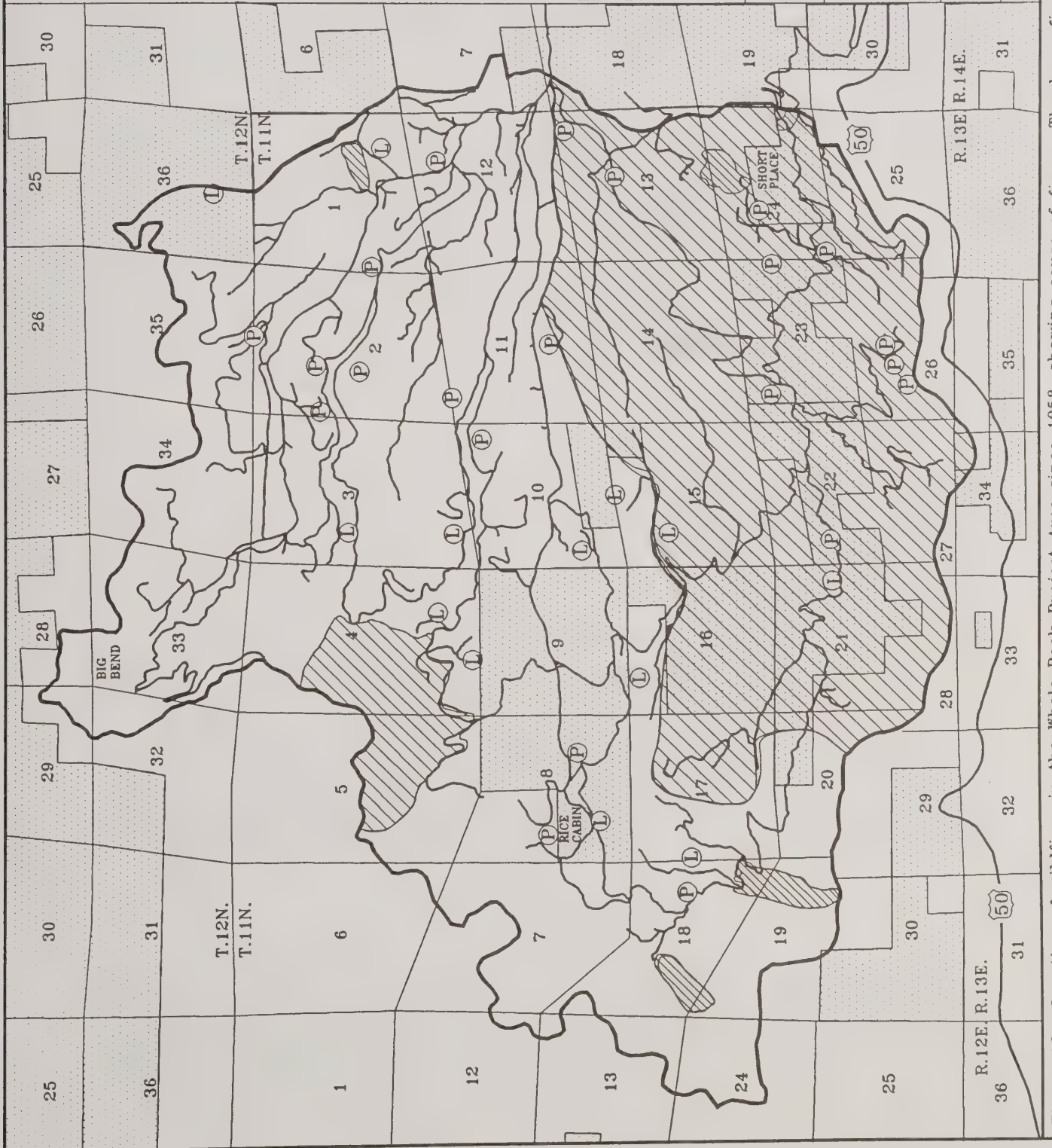


Figure 13. Location of wildfires in the Whale Rock Project Area since 1958, showing cause of fires. The large fire in the southern portion of the project area is the 1959 Icehouse fire.



a large fire (over five acres) has burned inside the project area on an average of every 5.1 years, with an average of 201 acres burning annually.

Current fire management direction for the area is to control 97% of all wildfires to a 10 acre maximum size limit. Over the past 36 years, 14% of the fires have exceeded this size limit. Four of the seven large fires burned at such high intensities that nearly 100% of the trees inside the burns were killed. Most of the acreage inside these areas was subsequently clearcut during fire salvage operations. Fuel loadings, dense thickets of trees and brush, and well developed fuel ladders are the primary reasons that large stand-replacing fires are becoming the norm in this area. For additional details regarding fuel loadings, see Appendix F.

Of particular concern from a fire management standpoint are the recent residential developments that have occurred on the private lands inside the project area. In 1977 there were approximately eight private land holders in the area; presently there are thirty-nine. This development is taking place along the White Meadows Road in the lower third of the South Fork of the American River Canyon. These south-facing mid-slopes are the worst possible location for development to take place from a fire control perspective. Along with the new homes come overhead power transmission lines, a potential source of wildland fire (two of the seven large fires in the last 36 years were started by faulty power lines, and are classed as person-caused). As these parcels continue to split and be sold, the number of private land holders will continue to grow, and so the number of person-caused fires can be expected to rise.

Another condition of the Whale Rock area affecting fire and fuels is the number of standing dead trees (snags) throughout the analysis area. After seven years of drought, coupled with no salvage logging during the past two years, thousands of snags are now present throughout the Whale Rock area. Snags are a major contributor to long range spotting when a wildland fire occurs and present a serious safety hazard to fire personnel conducting prescribed burns or fighting wildland fires (eleven wildland firefighters have been killed by falling snags since 1987 in California, and at least a dozen more have suffered serious injury). Snags are also a serious safety hazard to the general public; five forest visitors were killed by falling snags on National Forest lands in California in 1993. The numbers of snags in Whale Rock are so high that District fire and fuels management experts believe that forest roads can no longer be considered effective or safe locations for backfiring during fire suppression efforts. This is in stark contrast to earlier condition when roads were always considered one of the first lines of defense in suppressing wildland fire, both for access to fires and as fuelbreaks.

## **AIR QUALITY**

The amount of particulate matter that is permitted to be generated by various industries or activities is regulated by the Eldorado County Air Pollution Control District and the California Air Resource Board as per state regulations and the Federal Clean Air Act. The rules and regulations controlling air pollution are intended to protect both human health



and visual quality. The Federal standards for maximum quantities of particulate matter are 150 micrograms per cubic meter. California Air Resources Board establishes a maximum of 50 micrograms of particulate matter per cubic meter averaged over a 24 hour period.

Particulate matter that is smaller than 10 microns (PM 10) in diameter is the size class of material considered a pollutant and a health hazard. PM 10 can destroy portions of the bronchial lining and take as long as 6 weeks to heal. Particulate matter larger than 10 microns is not considered an air pollutant because of the brief period of time this larger material remains airborne. Particulate matter may originate as smoke from all types of fire or as fugitive dust from ground disturbing activities.

The proposed project is within the Mountain Counties Air Basin, which is a Class II airshed. Desolation Wilderness, 14 miles east of the proposed project area, is a Class I airshed. Monitoring is not done within Desolation Wilderness for visibility; however, public reports indicate that visibility is good to excellent most of the time within the Wilderness. Air quality is good most of the year in Pollock Pines, a small community of 4,000, located one mile southwest of the proposed project area. Placerville, with a population of over 9,000, lies 13 miles west of the proposed project area. Air quality is good most of the year in Placerville, although the town is affected by wood smoke from houses during the winter season. Placerville also has reduced visibility to the west from the Sacramento metropolitan area during summer.

During the summer, winds over the proposed project area are typically southwest from the Sacramento River Delta. Local upcanyon, upvalley winds dominate most of the rest of the year except during periods of foehn winds (from the north and east) which occur less than 20% of the time. Foehn winds are a special type of local wind associated with mountain ranges (in California, one of the well-known foehn winds are the Santa Anas, which primarily affect southern California).

## **VISUAL RESOURCES**

The Whale Rock Planning Area is characterized by moderate to steep 'V' shaped canyons, with major separating ridges running east to west. Lateral drainages and separating ridges, which lack distinctive landform configurations, run generally north and south. The planning area has landscape characteristics common to the lower elevations of the Sierra Nevada western slope.

### **Existing Visual Condition**

The Existing Visual Condition (EVC) represents the visual condition of the landscape presently seen on the ground. The EVC serves as a baseline to measure the effects resulting from various management activities on the visual quality of the landscape (see Figures 18 and 19).

EVC is measured in terms of condition types I, II, III, IV, V, and VI. The following condition types have been inventoried within the planning area:

Type I - NATURAL CONDITION AREAS in which only ecological change has taken place. This corresponds to the Preservation Visual Quality Objectives (VQO).

Type II - NATURAL APPEARING AREAS in which changes in the landscape are not noticed by the average forest visitor. This corresponds to the Retention VQO.

Type III - SLIGHTLY ALTERED AREAS in which changes in the landscape are noticed, but do not attract attention. This corresponds to the Partial Retention VQO.

Type IV - MODERATELY ALTERED AREAS in which changes in the landscape are easily noticed and may attract attention. This corresponds to the Modification VQO.

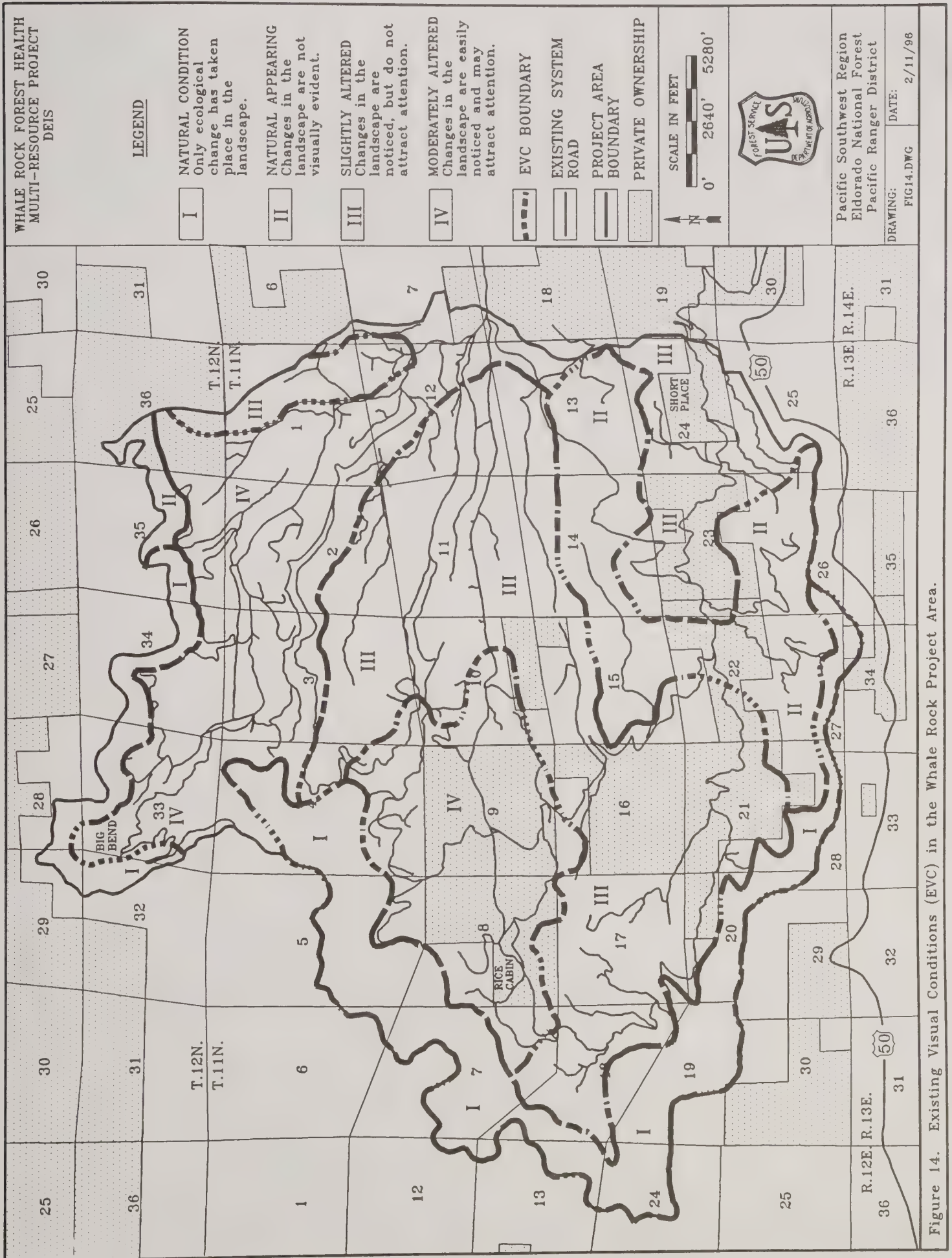
Approximately 60% of the planning area is in existing visual condition types III and IV. These conditions are the result of past management practices and the Ice House Fire in 1959. The remaining 40% of the planning area is in condition types I and II. These condition types are found over a majority of the landscape seen from the viewshed corridors of State Highway 50 and the South Fork of the American River.

### **Affected Viewsheds**

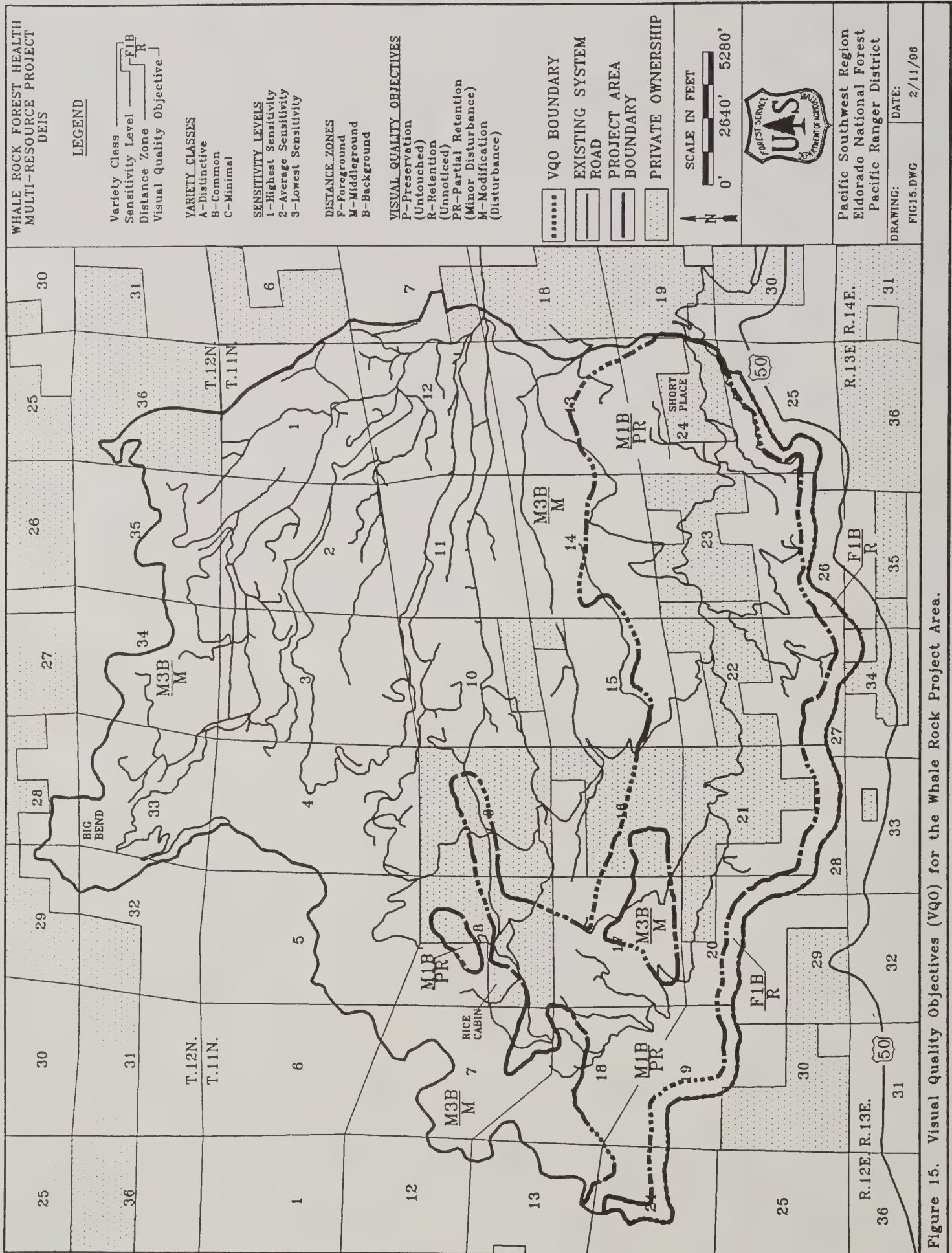
The visual resource is managed according to the standards and guidelines for Management Areas 20 (Visual Foreground Retention) and 23 (Visual Middleground Partial Retention) as described in the LRMP (4-221-228; 4-246-253).

There are two viewsheds that affect the planning area: Highway 50, a California State Scenic Highway, and the South Fork of the American River. The Visual Quality Objectives for both of these viewshed corridors are Retention (R) for the foreground views and Partial Retention (PR) for the middleground views. These views are currently natural appearing (EVC I and II) with some minor landscape alterations (EVC III) evident from Highway 50. These alterations primarily result from the dense even-aged pine plantations established after the Ice House Fire in 1959. In general, foreground and middleground views have a moderate visual variety due to the pockets of older mixed conifer stands that survived the fire and the patterns of brush and open rocky areas that occur in the seen areas.

The portions of the planning area outside the foreground and middleground views from the two viewsheds is seldom seen and has a VQO of Modification (M).







## TRANSPORTATION

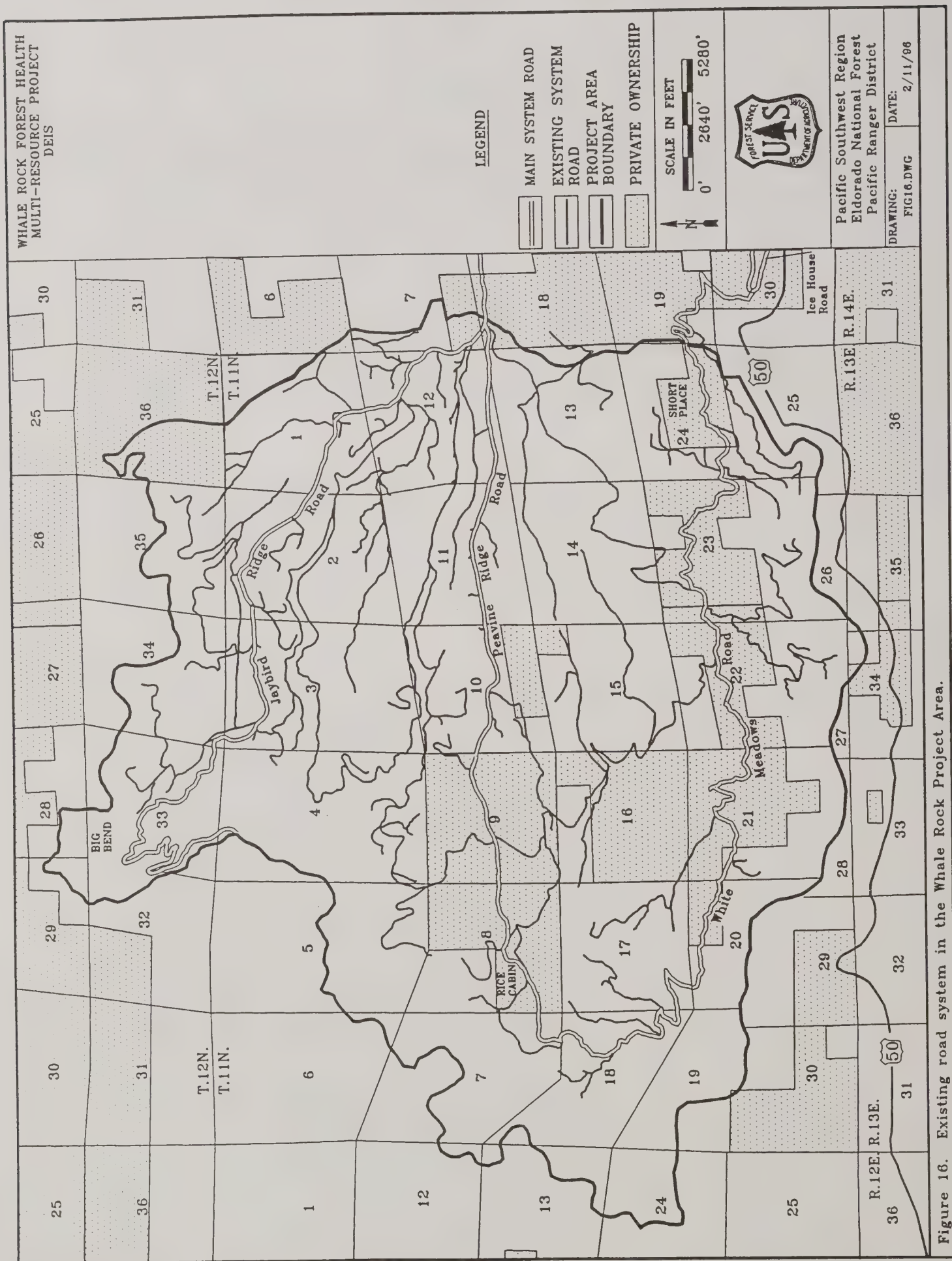
The Whale Rock Analysis Area is accessed by one major arterial and four collector roads (Figure 16). The arterial 17N12 (Soda Springs Riverton Road, commonly referred to as the Ice House Road) is a double lane paved El Dorado County road, No. 147. The collector roads, 11N55.1 (eastern portion of Peavine Ridge Road), 11N60.1 (Jaybird Springs Road), and 11N65 (White Meadows Road) are single lane chip sealed roads. Surface replacement deposits would be required prior to any commercial hauling on 11N55.1 and 11N60.1. Road 11N63 (the western portion of Peavine Ridge Road) is a native surface road with some spot surfacing. White Meadows Road is also a County road (No. 1041). All road right-of-ways needed for the area have been previously acquired. Hauling of products from the analysis area would be via the four collector roads, 11N55.1, 11N60.1, 11N63 and 11N65 to the arterial 17N12 Road and thence to Highway 50.

The remaining roads in the analysis area are low standard, native surface local roads. The projected traffic volumes and mixes indicate that these single lane roads will safely accommodate predicted traffic volume. Some roads would need reconstruction in order to accommodate certain kinds of equipment such as chip vans. This reconstruction would consist of cut bank shaving, fill additions, culvert extensions, road rocking and some minor clearing. Rocking of certain roads will provide for improvements to water quality (see Appendix G for details).

Water sources are available in several limited places within the analysis area for use in dust abatement and as sources for firefighting. The White Meadows Road crosses two drainages in the SW1/4 of Section 19, T11N, R14E on Sierra Pacific Industries (SPI) property on the eastern edge of the analysis area. Both of these drainages have concrete headwalls and wingwalls. In the past, these drainages have been used as water sources by partially blocking the entrances with plywood. Water collects behind the culverts, and water trucks draft the water while positioned on the road. These are potential water sources for the southern portion of the project area, although permission would need to be secured from SPI in order to use them, as well as a developed spring in Spring Valley. There is also a water source at the Jaybird tunnel adit. Several other water sources are located to the east of the analysis area, including a direct draft source off of 11N14Y at the double culvert crossing of the South Fork of Silver Creek. This is one of SPI's mainline roads; an agreement would also be needed from SPI for use. A developed water hole, on 11N55C at Chicken Hawk Spring is managed cooperatively with SPI. Another developed waterhole is located on 17N12YA just off Icehouse Road at Cox Canyon.

Appendix D contains a more detailed discussion of the transportation systems for the Whale Rock area, and specific project needs for each alternative.







## RANGE

Two range allotments, separated by an allotment boundary fence, are situated within the Whale Rock area. The Soldier Creek Allotment is entirely within the project area. This allotment has been vacant since 1988, and there are currently no outstanding applications to reactivate it. The allotment permits 60 cow/calf pairs on Forest lands, and 60 cow/calf pairs on private lands owned by Sierra Pacific Industries from June 1 to September 15.

The second allotment, Big Hill, is shared by two permittees. Roughly 10 percent of the Big Hill Allotment extends a short distance into the eastern portion of the Whale Rock area. One hundred and thirty cow/calf pairs graze in the Whale Rock area of the allotment from June 1 to June 15. After June 15, the majority of the cattle are dispersed to other locations within the allotment.

Both allotments are considered to be transitory range. Transitory range areas include sites that have undergone timber harvest, wildfire or prescribed burns that subsequently produce forage. Primary browse in transitory range includes deerbrush, whitethorn and manzanita.

## RECREATION

The Whale Rock Analysis Area provides for recreation opportunities with low to moderate interaction between users (refer to the Eldorado LRMP sections on the Roaded Natural (RN) and Semi-Primitive Non-Motorized (SPN) Recreation Opportunity Spectrum (ROS)). There are no developed public facilities and only light to moderate dispersed recreation use of the analysis area. The majority of use consists of dispersed camping during hunting season. Light use of the area also occurs by hikers, recreational gold panners and prospectors, wildflower enthusiasts, mushroom collectors, persons driving off-highway vehicles (OHVs), persons fishing, motorcyclists, mountain bicyclists and equestrians.

The South Fork of the American River defines the southern boundary of the analysis area. This portion of the river is eligible for consideration for inclusion into the National Wild and Scenic River System as a Recreation Classification river. The Forest Service is directed to protect or enhance those outstandingly remarkable values for which the river is eligible; these include recreation and historical/cultural values. Fishing, swimming and kayaking occur on the river to a limited extent. The Semi-Primitive Non-Motorized opportunity class extends along a portion of the river to the confluence with Silver Creek, and then extends up the Silver Creek Canyon to Camino Divide Reservoir.

Approximately 58 miles of unpaved transportation system roads designated for OHV use traverse the Whale Rock Analysis Area. There are no system trails, although the recently designated National Historic Trail (the Pony Express Trail) crosses the project area.

## CULTURAL (HERITAGE) RESOURCES

Cultural resources are the remains of human activity which provide a record of past human interaction within the ecosystem. The analysis area contains evidence of human activity over a long period of time, with the heaviest use occurring within the last 4,000 years. Materials from the surrounding forest area indicate that people have been visiting the general vicinity for at least 7,000 years, although no evidence currently exists in the Whale Rock area for such extensive use.

The earliest Native American groups to use the Whale Rock area hunted large animals such as deer with darts tipped with large stone points propelled by a throwing stick (atlatl). The bow and arrow replaced the atlatl around 1,500 years ago. Seeds from a variety of plants were ground into flour or meal on a flat stone grinding slab with another stone held in the hand. Bedrock mortars (grinding holes in boulders or outcrops), used with cylindrical stone pestles for pulverizing acorns and other foodstuffs, were in use before the bow and arrow, and are still important food processing equipment.

By 500 years ago, permanent villages were well established on the western Sierran slopes at elevations lower than the annual winter snowline (generally below 3,500 feet), with most of the known villages occurring well below Forest lands. Inhabitants of these villages, as well as people from the east side of the Sierra, were visiting what is now the Forest to procure resources not available in the lower elevations. Archaeological evidence in the Whale Rock area indicates no permanent villages, but points to the presence of camps where seeds were processed on millingsstones or in bedrock mortars, and where stone tools were refurbished.

Two different Native American ethnographic groups were probably using the Whale Rock area. The Nisenan Maidu had their winter villages below the snowline on the west slope of the Sierra and probably represent the major users of the analysis area. The Washo had their permanent villages east of the Sierra, roughly in the present-day Reno to Markleeville area. Both groups would have used this region as a travel corridor and locale to harvest acorns, pine nuts, deer, fish, plants and other resources. In addition to visiting the area to gather specific resources, each would acquire a variety of items through trade with each other and the neighboring Miwok. Commerce among the Washo, Nisenan and Miwok included exchange of salt, pine nuts, obsidian and rabbitskins from the east for acorns, bulbs and sea shells (used as currency and for ornaments) from the west.

The Nisenan and Miwok continued their traditional lifeways until the California Gold Rush, when the great influx of Euroamerican miners in 1849 and the early 1850s had devastating consequences for these people. The 1860s Comstock Silver Strike in Nevada had similar repercussions for the Washo. By the mid-1860s the impacts of disease, violence, environmental degradation and starvation had severely disrupted conventional activities of all three groups. Today many of the descendants of these people live in the western Sierra foothills and the valleys adjacent to the east slope of



the Sierras. Numerous traditional activities, such as hunting, fishing, gathering and basketmaking, are still practiced.

Historic Euroamerican activities in the Forest were similar to those of today. Early mining, transportation, dairying and livestock grazing, water conveyance, logging and transportation left important remains on the landscape in the Whale Rock area.

The rush for gold in California brought thousands of immigrants from around the world to the Sierras in the late 1840s through the 1850s. Several hydraulic mines were located in Whale Rock; these probably operated between the 1850s and the early 1880s. In the first half of the twentieth century, several tungsten and silver claims were established in the area. These mining activities have left remains such as prospecting holes, shafts, adits, tailings, hydraulic scars and ditches in the analysis area.

By the 1850s, a number of heavily used transportation routes crossed what are now Eldorado National Forest lands. These routes generally followed the trails established by the Washo, Nisenan, Miwok and their predecessors. In 1849-1852, John Calhoun Johnson ("Cockeyed" Johnson) located and improved one of these trails along the top of Peavine Ridge, and many of the county's first settlers entered California on this route (Supernowicz 1987). Remnants of this trail are still visible in the analysis area atop Telephone Ridge and on the slopes of the river canyon where the trail crossed to the south side of the river.

Another important transportation route in the analysis area was used to ferry mail by the Pony Express and Overland Stage Line. In 1851, Gold Rush communities began receiving mail on a monthly basis from Salt Lake City (previously, mail was delivered by steamship to Panama, by mule across the isthmus, then by steamer to San Francisco). The desire for faster mail delivery led to the establishment of the Pony Express, which brought mail to California in a mere 10 days. Pony Express mail was carried by individual riders on horseback; each rider covered between 30 and 50 miles, changing mounts three times before turning the mail over to the next rider in the relay. The section of the Pony Express route within Whale Rock was ridden by an 18-year-old from Sacramento named Warren Upson (Smith n.d.:53). Mail service by the Pony Express began in April of 1860 and terminated in October of 1861 when the Union Telegraph line was completed (Townley n.d.:8-9).

By the 1860s, most of the land within the analysis area had been taken from Native Americans using or residing in the area, although some, such as Emma and Hattie Tom, managed to hold onto property on Telephone Ridge. Early ranchers in the Whale Rock area included George and Fred Van Vleck, Alfred McManus, George and Nathan Rice, Eugene Chaix, Jeremiah Brownell, George Short, and James Quinn. Conflicts over grazing rights between cattle and sheep ranchers were common in these early days, as sheep tended to overgraze, increasing soil erosion (Supernowicz 1987). The Forest Service eventually mitigated grazing conflicts in the early 1900s by allotting specific ranges to individual ranchers. Cabins and ranch related features left by a number of these early ranchers are still evident on the landscape.



There is no record of any large, organized logging in the Whale Rock area before the turn of the century. From 1891 to 1905, a timber speculator, Frederick Kribbs, purchased large tracts of land on the north side of the American River. James Quinn sold his property to Frederick Kribbs in 1905, possibly deciding to sell from mounting pressure against sheep grazing. Kribbs in turn sold much of his property to Charles Smith, who founded the C.A. Smith Timber Company. This company was the predecessor to the Michigan-California (Mich-Cal) Lumber Company (Supernowicz 1987). Mich-Cal operated a mill in Camino which was sold in 1994, along with company lands, to Sierra Pacific Industries.

Other local timber interests in the Whale Rock area were held by the Blair Brothers (John, James, Matthew and Robert), who emigrated from Scotland to the county in the 1850s. By 1856, the Blairs had established the first of 10 sawmills they and their families were to operate in the county. Their last mill site, the Pacific House Sawmill, was operated between 1927 and 1958 in the river canyon across from Pacific House. Remains of this mill are still visible within the analysis area. The Blairs' timber holdings were sold to Mich-Cal in 1958 (Parker 1988:41-44).

The Forest Service began administering the public lands shortly after the turn of the century. In 1910, the Eldorado National Forest was established from lands previously managed by the Tahoe and Stanislaus National Forests, in combination with newly acquired lands.

This longtime use of lands within the present-day analysis area has left archaeological deposits and historic features throughout the area. Since 1976, archaeological surveys have been conducted, resulting in coverage of roughly 85% of the public lands in the analysis area, although 10% of this was "cursory" and would not constitute adequate coverage for most types of ground-disturbing activities. However, areas not surveyed generally include very steep slopes and ground covered by dense brush. Some landscapes considered to be archaeologically sensitive remain unsurveyed (estimated at less than 8% of the total analysis area); it is expected that additional cultural resources might be encountered on some of this terrain.

Archaeological surveys in the analysis area have resulted in the location and recording of a total of 73 sites, 13 of which are known to be situated entirely on private lands. Forty-seven of the 70 sites in the analysis area are prehistoric (i.e., Native American), 19 are historic (i.e., Euroamerican), and 7 have mixed prehistoric and historic components. The prehistoric sites range from complex temporary campsites showing a wide range of human activities, to food processing locations with single bedrock mortars, to places where a single-episode event occurred such as the killing and butchering of a large game animal. The more complex sites include midden (soils which have been changed by organic material left by people), lithic deposits (stone tools and the debris from their manufacture) and food-processing facilities such as bedrock mortars. Historic remains include cabin sites and other ranch-related features, hydraulic mines and water diversion facilities, historic trails and wagon roads such as Johnson's

Cut-Off and the Pony Express Trail, and toll houses and stage stops associated with the early wagon roads. These prehistoric and historic remains are considered to be the cultural "resources of interest" for the Whale Rock area.

Many of the cultural resources in the analysis area may be found to be eligible for inclusion in the National Register of Historic Places. None are currently listed, although eligibility determinations for five sites have been made. Three of these were cabin sites determined to be eligible in the 1970s (FS No. 05-03-55-28, -29 and -30). Updates of 55-29 and -30 in the last few years showed that the integrity of these structures was seriously compromised and that they were no longer considered eligible for listing. Since the original status of the cabins was not clearly indicated in early recording efforts, it is not possible to ascertain the amount of decline of these properties. The condition of site 55-28 is not presently known. One other cabin site (55-106) was evaluated for site significance in 1982 and found to be not eligible for inclusion to the Register. In addition, the ditch associated with the Brockliss Hill mine (55-180) was found to be ineligible.

An archaeological report, ARRA No. 05-03-331-193, formally documents the above findings (Deal 1994). Copies of the ARRA are housed at the Forest Supervisor's Office in Placerville.

## **HISTORICAL LANDSCAPE DESCRIPTION**

It is probably most relevant to picture the Whale Rock area (and most of North America) as a cultural landscape. In other words, evidence supports the notion that as long as people have used an area, they have also manipulated the ecosystem. Native American "stewardship," according to Dennis Martinez (1993), "helped determine forest and prairie structure, species composition and distribution, and quality of habitat." Native Americans in California frequently set fire to areas to increase forage (particularly for deer) and improve game habitat; to facilitate travel and hunting; to drive game; to clear areas around habitations to watch for dangerous animals (grizzly, mountain lion) and strangers; to improve wild seed crops (particularly of annuals and grasses) and maintain populations of edible bulbs, corms and tubers (such as brodiaea, onion and yampah); to improve certain characteristics of plants used in basketry; to maintain or enhance the distribution of oaks; to kill insects and pests; and to maintain springs and surface waters (Anderson 1992a, 1992b, 1993, 1994; Lewis 1973; MacLeery 1994; Matson 1972; McCarthy 1993; Mellars 1976; Wickstrom 1987; Shipek 1993; Williams 1993).

This deliberate setting of fires created a more open landscape, with less underbrush and a more even spacing between trees. Shade intolerant species would have been favored over those that are shade tolerant, such that pine would increase at the expense of incense cedar and fir (Johnston n.d.). Black oak stands would have been more extensive, as would some populations of grasses and annuals used as staple plant foods. More surface waters might have been available and springs and seeps more



reliable. Deer and other animals responding to the increase in forage or open terrain would proliferate. John Muir, in 1894, wrote of the openness of the Sierran forests, stating that it was not difficult to ride through the forests on horseback, a feat essentially unimaginable now. Willis Jepson wrote that "the singular spacing of (oak) trees is a result of the annual firing of the country by Indians" (1923:39).

The deliberate setting of fires continued with the influx of cattle and sheepmen into the Sierras in the mid- to late 1800s. Sheepmen set fires to facilitate the movement of flocks; dairy ranchers to increase forage in pastures. Differences in patterns of burning between the early Euroamericans and the Native Americans was noted by John Muir:

Indians burn off the underbrush in certain localities to facilitate deer hunting. Mountaineers carelessly allow their campfires to run, so do lumbermen, but the fires of the Muttoneers, form more than ninety percent of all the destructive fires that range the Sierra forests (Muir 1894:199).

Setting of fires by shepherders was so prevalent, in fact, that travel in the late 1800s was often hampered in autumn by dense smoke (Johnston n.d.). The incidence of destructive stand-replacing fires in the late 1890s brought the first attempts to suppress fires, to protect both watersheds and valuable timberlands.

A fire history conducted just east of the Whale Rock analysis area in 1993 (Gethen 1994) found that between 1768 and 1992 (a 224 year period), the average length of time between fires burning through a stand was 8.6 years. The fire regime in the area during this period was one of frequent low- to moderate-intensity ground fires. These periodic fires removed ground fuels and fuel ladders in different areas every few years and provided a more open landscape.

A second fire history completed in 1994 found similar fire intervals in a study further east of Whale Rock at higher elevations (Ferrell 1994). The historical frequency of fire occurrence was determined in this area through the analysis of fire-scarred trees and historical documents; these frequencies were then tested statistically against the frequency of lightning fires. Ferrell's analysis found that the prehistoric frequency of lightning fires alone could not account for fire occurrence in half the stands analyzed, indicating that "Native American burning was significant in this area" (1994:7). Ferrell's study also found that lightning fires alone could not account for the frequency of fires after ranchers began using the area in the 1860s; again, this increased number of fires was accounted for by the deliberate setting of fires to pasture land.

The destructive, large scale burning practiced by the "muttoneers" soon led to the policy of suppressing forest fires. In Ferrell's study, the number of fires was found to drop off significantly in the "Suppression Era" (1930 to 1993), when fire frequency finally matches that expected for lightning. Fire histories in other portions of the Sierras have arrived at the same conclusions (Reynolds 1959; Vankat 1970; Kilgore 1972).



At least two effects of fire exclusion as a policy can be witnessed on the landscape. The first of these involves changes in distribution of vegetation in areas no longer subject to periodic burning. As fire suppression increased through time, so too did the density and cover of conifer species; black oak and pine stands decreased, and shade and fire intolerant conifer species increased (Johnston n.d.; Covington et al. 1994:22-36). In Yosemite, for example, Vankat has noted a dramatic increase in the numbers of white fir since 1860, which was attributed to 'the demise of the Indians in the park region, so probably due to the elimination of Indian burning' (1967:73). White fir has spread in the Whale Rock area as well, since suppression policies were enacted.

The second effect of fire exclusion involves the rapid increase of fuel loads coupled with the dramatic increase in catastrophic fires. In discussing the difference between Maidu patterns of burning and those of Euroamericans along the American River, Alfred Kroeber (1925:396) states that:

It appears that forest fires have been far more destructive since American occupancy owing to the accumulated underbrush igniting large trees.

Fires ignited by Native Americans and those started prior to the suppression era by lightning helped maintain low fuel loads (Covington et al. 1994:44). Since the enactment of fire exclusion, however, fuel loads have increased and fire intensities are greater, with significant damage to property, timber, soils and watersheds (Averill et al. 1994:13-15; Covington et al. 1994:22-36; Grahm 1994:334-341; Mutch 1993; Phillips 1995). Fisheries, too, can be directly destroyed by large scale fires, with fish boiled to death in streams (Knudson 1994; O'Carroll 1994).

Based on aerial photos from the 1940s, the Whale Rock project area was historically comprised of much more open habitat types. The area was dominated by ponderosa pine stands with less than 50% canopy closure, often with an understory of low lying grass and forbs. Also occurring throughout the area was the montane hardwood conifer type. Areas included black oak and ponderosa pine intermixed in pure stands, with the pines forming the dominant overstory and oaks providing the understory. The Sierran mixed conifer type was concentrated in drainages and north facing canyon slopes. These stands were dominated by large sugar pine, incense cedar and ponderosa pine trees with an understory including dogwood, alder and yew. Pure hardwood and pure montane chaparral occurred in patches throughout the area. Chaparral was found mainly on ridgetops and on steep, south facing slopes. Table 15 shows density and acreage of Wildlife Habitat Types in 1940 and 1991. The 1940 acreage can be compared to the current distribution of habitat types to indicate the Historic Range of Variability for the Whale Rock area (see also the maps included in Appendix B). It should also be kept in mind that the area was probably far more open than indicated in the 1940s photos, with less understory, during at least the last millennia, prior to the practice of suppressing (rather than setting) fires.

**Table 15. ESTIMATED HABITAT TYPE ACREAGES FROM AERIAL PHOTOGRAPHS**

<b>1940 Aerial Photo Habitats</b>					
<b>Density</b>	<b>SMC</b>	<b>PPN</b>	<b>MHC</b>	<b>MHW</b>	<b>MCP</b>
D	1955	358	1229	431	871
M	413	1928	1734	91	202
P	505	—	2772	—	734
S	—	4458	—	—	—
<b>1991 Aerial Photo Habitats</b>					
<b>Density</b>	<b>SMC</b>	<b>PPN</b>	<b>MHC</b>	<b>MHW</b>	<b>MCP</b>
D	2039	1818	1276	239	46
M	2589	514	1966	469	92
P	340	606	330	—	—
S	90	1497	918	—	—

**KEY**

D = Dense canopy closure (60-100%)  
M = Moderate canopy closure (40-59%)  
P = Open canopy closure (25-39%)  
S = Sparse canopy closure (10-24%)

SMC = Sierran Mixed Conifer  
PPN = Ponderosa Pine  
MHC = Montane Hardwood-Conifer  
MHW = Montane Hardwood  
MCP = Montane Chaparral

Open stands of ponderosa pine are more fire-tolerant and less susceptible to insects and disease and changes in climate and atmospheric chemistry (Covington et al. 1994:30-35; Grahm 1994). If the Whale Rock area were returned to its historical character, the result would be a healthier, more resilient, sustainable forest.

**SOCIOECONOMIC ENVIRONMENT**

Any healthy economy must be based upon sound environmental practices and the sustainable industries those practices support. The forest products industry requires sound forestry practices in order to remain healthy and sustainable in the long term (Ball 1994). "Good" forest health implies a forest ecosystem with a structure that is complementary to long-term management objectives. "Poor" forest health exists when a forest's ecosystem condition detracts from the potential productivity of that forest, as defined by management objectives. Costs of forest health decisions can be measured by cash flow accounting, as economically imposed trade-offs or in terms of social effects. The economic value of "good" forest health may be measured by the costs of "poor" forest health (McKetta et al. in Sampson 1994:140-142). The socioeconomic costs of "poor" forest health include the costs of fire prevention and suppression, foregone commodity values and safety risks to woods workers and the public.



For this project, the economic environment includes commodity values, both existing and foregone, and fire suppression costs. Commodity values recognize the elements of direct project costs and benefits, including predicted receipts, taxes and employment (all values, costs and assumptions presented here are used to analyze effects in Chapter IV). Foregone economic value is the unrealized timber growth, as measured in dollars lost, which occurs when a forested landscape burns under catastrophic fire conditions. For simplicity, this document uses an average value of \$10,000 per acre. This figure is based on estimates of foregone timber opportunities made after the Cleveland Fire and corresponds reasonably well with the \$8,077 discounted timber value of a 30 year old plantation (Mackey 1992). The \$10,000 value recognizes both a diminished value to merchantable trees and the unrealized future value of currently unmerchantable trees that occur as a result of high intensity wildfires.

For Whale Rock, the social environment includes local lifestyles, attitudes, beliefs and values. Population trends and characteristics such as ethnicity are also discussed. The specific social concerns associated with private residences located adjacent to a high fire risk environment, and public and woodworker safety in terms of snags, are also described.

Although the Whale Rock Project is located entirely within El Dorado County, the socioeconomic environment is not similarly confined. The economic environment extends well beyond county, state or even national boundaries. For example, timber commerce is now conducted on a global scale and, to a degree, supply and demand on an international scale is affected by projects such as Whale Rock. On a local scale, the socioeconomic environment consists of government entities, businesses and people who are directly or indirectly affected by activities within the National Forest that generate receipts or employment opportunities. Because the social and economic environments are intertwined, they have a complex relationship that has both a historical and a contemporary context. In order to describe the contemporary socioeconomic environment it is necessary to recognize the local and regional evolution of the affected communities.

The Whale Rock area is associated with a history of commodity uses including mining, periodic green timber harvests, salvage harvesting, commercial and personal use firewood cutting, cattle grazing, and the generation and transmission of hydroelectric power. These activities have in part supported the economic and social needs of the public and local communities.

### **County Receipts**

As a result of the Twenty-Five Percent Receipts Fund Act of May 23, 1908, 25% of all funds received during any fiscal year from each National Forest are paid to the county or counties in which each National Forest is located. This 25% payment is divided among all counties occupied in proportion to the National Forest area within each county. Therefore, 25% of any funds derived from the sale of products from the Whale Rock Project would be returned proportionately to Alpine (8%), Amador (12%), Douglas (less



than 1%), El Dorado (73%) and Placer (7%) Counties. The receipts that the counties receive from this 25% allocation are mandated to be used for the benefit of public schools and public roads.

The revenue sharing funds contributed the percentages indicated in Table 16 to the county school and general budgets during the 1991-92 fiscal year.

<b>Table 16. Revenue Sharing as a Percent of the Total County Budget <sup>1</sup></b>		
<b>County</b>	<b>School Budget</b>	<b>General Budget</b>
Alpine	15.54	6.32
Amador	1.59	1.18
El Dorado	1.62	1.79
Placer	0.39	0.41
Douglas	0	0

<sup>1</sup> Baumbach (1994).

Douglas County contains less than 1% of the Eldorado National Forest's land base; therefore, it will not be specifically described in the socioeconomic environment of this project. Since approximately 73% of the Eldorado National Forest is within El Dorado County, greater detail concerning the socioeconomic environment will be presented for El Dorado County than for Alpine, Amador or Placer counties. El Dorado County is considered fairly similar to Amador and Placer counties, although Placer County is more urban and Amador County more rural. These three counties are experiencing similar trends and have similar characteristics (Baumbach 1994). Alpine County is included in the discussion primarily because of the significance of the Twenty-Five Percent Receipts Fund Act in the county's economy. Finally, since the Whale Rock Project includes alternatives involving the harvest of timber products, the following discussion will focus on the role that the harvest and manufacturing of timber products plays in the socioeconomic environment.

El Dorado, Amador and Placer counties are the principal timber producing counties on the Eldorado National Forest. The closest processing facilities are in these counties. In 1992, 81% of the timber volume produced on the Eldorado National Forest was processed in these three counties (Baumbach 1994). Most of the employment related to timber harvest and manufacturing is performed by residents of these counties.

Alpine County is the least populated county in the local socioeconomic environment of the Whale Rock Project. The largest industry in Alpine County is tourism. Eighty percent of total county employment is accounted for in services for tourists and recreationists. An additional 13% of employment is supplied by government jobs. All other industries contributed less than 8% of the total employment (Eldorado National Forest 1988:3-4). In fiscal year 1994, Alpine County received approximately \$568,000 from the Eldorado National Forest's 25% Receipt Fund.

Amador County's economy is centered around tourism, the wood products industry and agriculture. Tourism accounts for approximately 35% of total county employment. Approximately 500 people are employed in the two lumber mills in the county (Eldorado National Forest 1988:3-5). In 1994, Amador County received \$867,000 as its share of the 25% funds.

Placer County has the highest population of the affected counties. The eastern portion of the county relies on year-round recreation for income and employment because of its association with Lake Tahoe. The services industry accounts for nearly 21% of total county employment. The lumber and wood products industry operations throughout the county account for approximately 3% of the total county employment (Eldorado National Forest 1988:3-7). In fiscal year 1994, Placer County received \$525,000 from the 25% Receipt Fund.

### **Population of El Dorado County**

The El Dorado Community Assessment (McLaughlin & Associates 1991) has described El Dorado County's population as diverse, with both rural and urban aspects. It can be characterized by a number of socioeconomic attributes that are similar to those of Amador and Placer Counties, but differ markedly from national averages:

- \* Non-Urban Working Families represent 14.8% of the population (3.5 times the national average). This group is characterized by average income, average education, two or more workers per household, and homes built in the 1960s or 1970s.
- \* Rural Retirees represent 14.6% of the population (6.5 times the national average). This group is characterized as older, mobile, with below average income, average education, fewer children, and mobile homes located in rural areas.
- \* Highly Mobile Young Families represent 14.1% of the population (3.5 times the national average). This group is characterized by working couples, young children, new homes, above average income, above average education, and white collar workers.
- \* Low Income Farmers represent 12.8% of the population (6.5 times the national average). This group is characterized as having below average education, households with one worker, and as rural.
- \* Young Urban Ethnics represent 11.2% of the population or 4.5 times the national average. This group is characterized as highly mobile, low income, average education, few children, ethnic mix, singles, and apartments.
- \* Young Affluents with Children represent 8.3% of the population (3 times the national average). This group is characterized as very high income, highly mobile,

well educated, professionally employed, homeowners with new homes or condominiums in prime real estate areas.

\* Older Mobile Well Educated represent 6.7% of the population (3.5 times the national average). This group is characterized by above average income, fewer children, and white collar workers.

These groups have multiple agendas and issues and no one group is dominant, creating political fragmentation. The urban groups generally value the rural lifestyle, but came from urban backgrounds and have urban values, urban expectations, and are generally upwardly mobile. The rural groups generally have marginal economic viability with their present skills and occupations and risk being forced out of the economy (McLaughlin & Associates 1991).

The population and population projections for El Dorado County from 1950 to 2010 are displayed in Table 17. El Dorado County is currently one of the fastest growing counties in California. The population grew 47% between 1980 and 1990 and is projected to increase by 31% between 1990 and 2000. Most of this increase is projected to occur in the west side of the county. Since 1985, over 80% of this population growth has occurred due to net migration into the county from other areas.

<b>Table 17. El Dorado County Population and Population Trends, 1950 to 2010</b>	
<b>Year</b>	<b>Population</b>
1950	16,207
1960	29,390
1970	43,833
1980	85,812
2000	164,600
2010	218,700

Source: Community Services Planning Council (1991) and Sedway Cooke Associates (1992a, 1992b).

The population in El Dorado County lacks ethnic diversity (Table 18), as compared to California as a whole. The population of El Dorado County is also relatively older than the California population, with a median age of 35.3 years (Table 19). Many retired people are moving to El Dorado County, principally from California's urban centers. These new residents may not hold the same values related to resource commodity production as the earlier county residents (Community Services Planning Council 1991).



<b>Table 18. El Dorado County Ethnicity, 1990</b>	
<b>Ethnic Group</b>	<b>Percent</b>
White	89.7 %
African American	0.5 %
Native American	1.0 %
Hispanic	7.0 %
Asian and other	1.8 %

Source: Community Services Planning Council (1991).

<b>Table 19. El Dorado County Population Distribution by Age, 1990</b>	
<b>Age Group</b>	<b>Percent</b>
Under 5 Years	7.4 %
5 to 17 Years	19.0 %
18 to 64 Years	61.7 %
Over 64 Years	11.9 %

Source: Community Services Planning Council (1991).

### **Employment and Income of El Dorado County**

The county's economic base has historically relied on agriculture, mining, timber harvesting and tourism. More recently, diversification has improved as other types of manufacturing, retail, and service industries have increased in prominence. In 1990, all but five businesses in El Dorado County employed fewer than 200 people. Of those employing more than 200 people, two were lumber companies. In 1990, there were 66,500 employed residents in El Dorado County, compared to a total of about 34,200 jobs. The Bureau of Census estimates that 42% of the workers in El Dorado County commuted outside the county for employment in 1990, indicating that the local economy is very dependent upon employment opportunities from outside of the county, principally Sacramento County and the State of Nevada (Baumback 1994). The imbalance between jobs and population means more commuting, more traffic, more demands for transportation improvements, and more air pollution.

Table 20 shows that the largest sectors of employment in El Dorado County are retail trade and services. The county's economic growth is expected to accommodate 13,300 new jobs between the years 1990 and 2000, a 39% increase. Eighty percent of these new jobs are expected to be in the service, manufacturing, retail trade, local government and construction industries. Manufacturing and services are projected to be the fastest

growing employment sectors to the year 2010. The trend for manufacturing differs from the remainder of California due to the migration of industries to the county. Services, as a percent of total employment, are expected to increase from 22% to 28% by the year 2010. The only employment sector that is not expected to increase is agriculture. The logging and sawmill industries are included in the manufacturing sector and currently account for 50 percent of its employment. In 1990, Amador, El Dorado, and Placer Counties, combined, had approximately 2,000 people employed in the logging and sawmill industries (Baumback 1994).

<b>Table 20. El Dorado County Employment and Employment Projections, 1990 to 2010</b>			
Industry	1990	2000	2010
Agriculture	300	300	300
Mining	300	500	700
Construction	2,700	4,000	6,000
Manufacturing	2,000	3,200	5,200
Transportation, Communication, Public Utility	800	900	1,100
Wholesale Trade	600	900	1,200
Retail Trade	7,600	11,000	16,000
Finance, Insurance, Real Estate	1,500	2,100	3,000
Services	7,600	12,100	19,200
Local Government	4,700	6,200	8,000
State and Federal Government	1,600	2,000	2,700
Self-Employment	4,500	4,300	6,300
<b>Total</b>	<b>34,200</b>	<b>47,500</b>	<b>69,700</b>

Source: Sedway Cooke Associates (1992a; 1992b).

In 1992, the per capita personal income was \$19,729 in El Dorado County, compared to \$21,348 in California and \$20,105 in the United States. The median household income was \$35,058 in 1990. In 1992, the poverty rate in El Dorado County was 9.3 percent.

### **Taxes**

Employment from timber harvesting and manufacturing generates Federal and California income tax. The Federal and California income tax rates are estimated to be 15% and 3% respectively, of total employment related property and labor income. Timber harvest also generates California Yield Tax at the rate of 2.9% of harvest value. The State Board of Equalization returns 80 to 90 percent of the yield tax to counties. In addition, sales and property taxes are generated at an assumed rate of 5% of employment related property and labor income (Baumback 1994).

### **Employment Supported by the Timber Industry**

Each million board feet harvested supports the equivalent of five year-round jobs in the logging and sawmill industries. Employment in local government and education resulting from the 25% timber receipts, and jobs within the Forest Service, total an

additional two jobs per million board feet. Indirect employment is estimated at five jobs per million board feet. Indirect jobs result from the employment created by the local purchase of materials for sawmills, local expenditures by workers, and expenditures by local government employees. Approximately three-quarters of these indirect jobs would be in the trade and service sectors. All jobs are equivalent to year-round employment (Baumbach 1994).

### **Historical Perspective of the Forest Products Related Economy**

From the beginning of the California Gold Rush (1848-1854), El Dorado County has been a leader in the state's wealth and jobs created through resource extraction industries. Of particular importance was the lumber industry in El Dorado County. While mining played an important role in the nineteenth century, the logging industry provided jobs and helped sustain the county through several decades of economic decline in northern California. The most striking historical similarity between the lumber and mining industries is that both were cyclical in nature and were dependent upon local and regional markets, upturns and downswings in the economy, and other socioeconomic factors, including several national depressions (Supernowicz 1994).

The economic stability of El Dorado County fluctuated during the nineteenth and early twentieth centuries. Placerville flourished during the 1860s due to its location along the main transportation route between the Comstock Lode, Sacramento and San Francisco. The 1870s were characterized by a general decline in the population of the county and in most extractive industries. The Pacific Coast Business Directory reported in 1871 that 21 sawmills were active in the county, with a total potential output of 153,000 board feet per day. The 1880s to 1890s witnessed a slow increase in population, an increase in hardrock mining activity, and a general increase in lumber production which peaked in the early 1900s (Supernowicz 1994).

Although the Whale Rock project area was not affected, the post-1900 lumber industry of El Dorado County received a boost with the construction of two large sawmills and railroad logging systems, one along the Georgetown Divide and the other south of the North Fork of the Cosumnes River. World War I increased the demand for certain forest products, including pine and Douglas-fir. By 1932, following the stock market crash of 1929, there were 14 sawmills operating in El Dorado County, and the bulk of the lumber was produced by only two sawmills, the California Door Company and the Michigan-California Lumber Company. The total lumber cut between 1926 and 1930 varied from 52 million to 72 million board feet per year. The average milled value for these years was around \$1,500,000.

Between 1930 and 1940, falling lumber prices and a dwindling market for milled lumber resulted in the closing and dismantling of many sawmills in El Dorado, Amador, and Placer Counties. In 1943, twenty-six mills reported a gross annual cut of 180 million board feet of lumber. Of the 45 sawmills operating in and around El Dorado County in 1944, 16 were idle and, with the exception of the Placerville Lumber Company, the



majority had a greatly reduced cut. As World War II came to a close, the men who had served in the war began returning home. Sawmills that had closed during the war reopened. By 1946, there were over 50 sawmills active in El Dorado County alone. By 1950, the vast majority of all lumber was used in the booming residential home industry, and this created thousands of new jobs. In 1953, 26 sawmills reportedly were in operation near the Eldorado National Forest (Supernowicz 1994).

The role of the United States Forest Service in timber production accelerated between 1920 and 1950. Prior to 1920, the Eldorado National Forest provided a minimal amount of timber for sale to local lumber companies. Most of the logging prior to 1920 on National Forest land occurred along the western fringe of the Forest. The principal species cut prior to 1920 were ponderosa and sugar pine.

Logging within national forest lands dramatically increased in the 1920s in volume and area. During the period ranging from the 1920s through the 1940s, the Eldorado National Forest increased its sales, with the 1940s witnessing a dramatic increase in the volume of trees harvested on the Eldorado. Timber harvesting in the 1940s included a much broader range of the Eldorado, with a larger area cut over. Diesel truck logging became the principal means of conveying logs to the sawmills during this time. Because trucks required good roads, a major effort was made on the Eldorado to improve existing roads and build new truck haul routes. Although logging may have been initiated in the Whale Rock area as early as the 1860s with the Blair Brothers, logging contributions to the county economy from the Whale Rock area did not begin in earnest until the 1940s.

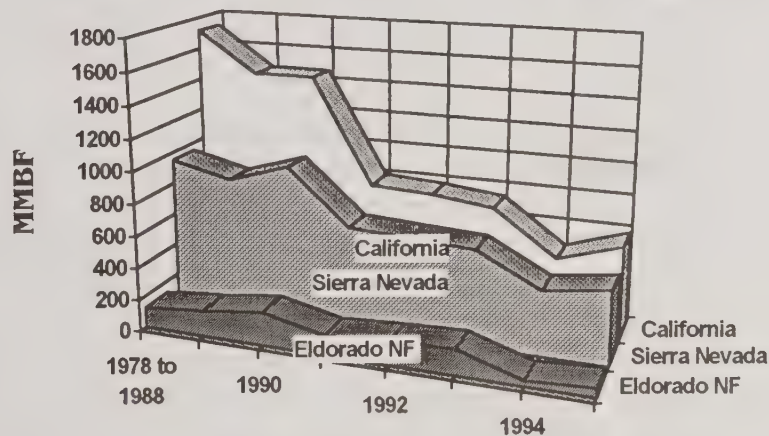
The 1950s ushered in further expansion in the lumber industry in El Dorado County and the Eldorado National Forest. The 1940s and 1950s were also two decades of extraordinary growth in the Forest's transportation network. Because of technical advancements in diesel trucks, lumber companies could haul logs longer distances. This capability, coupled with a 'baby-boom' economy, fueled by the expansion of the residential home industry, created a high demand for forest products, which continued to increase in the late 1950s.

### **Timber Supply**

National forests in California and the Pacific Northwest have supplied 40% of the wood used in California since the mid-1950s. However, since 1988, the Forest Service contribution to timber supply in California has been declining (Baumback 1994). Table 21 shows recent trends in Forest Service volume sold from California.

<b>Table 21. Recent Trends in Forest Volume Sold (MBF)</b>			
Year	Eldorado NF	Sierra Nevada	California
1978-88 Average	128,000	953,000	1,717,000
1989	161,000	861,000	1,459,000
1990	210,000	980,000	1,462,000
1991	124,000	645,000	794,000
1992	148,000	622,000	773,000
1993	160,000	601,000	729,000
1994	35,000	401,000	453,000
1995 Budgeted	58,000	459,000	577,000

**Graph 5. Recent Trends in Volume Sold 1988-1995**



### Stumpage and Lumber Prices

The decrease in timber supply, with little change in demand, has caused prices to increase. Since 1990, the Western Wood Product Association indices have increased by over 88 percent. During the same period, stumpage prices on the Eldorado increased by over 250 percent. Local lumber prices were 40% higher in 1993 than in 1992. This increase added \$4,000 to the price of a 2,000 square foot home. In 1993, the average stumpage price on the Eldorado was over \$600 per thousand board feet. With the change in species composition and smaller size, it is estimated that the average price will change to about \$400 per thousand board feet if there is no change in log market values. The high prices of lumber have made substitutes such as steel studs more competitive in the construction market (Baumback 1994).

### Timber Sale Revenues and Government Receipts

From 1984 through 1988, Eldorado National Forest receipts increased from \$12 million to \$17 million. Timber sale receipts since 1989 on the Eldorado have increased from \$21 million to nearly \$29 million, as shown below. Approximately 95% of all receipts result from the harvest of timber sales.

<b>Table 22: Eldorado National Forest Receipts Since 1989</b>	
<b>Year</b>	<b>Forest Receipts</b>
1989	\$21,194,862
1990	\$20,550,616
1991	\$20,766,796
1992	\$20,826,513
1993	\$23,954,893
1994	\$28,764,489

It is projected that smaller volumes will be harvested in the near future than in the past. In addition, the volume harvested will be of lower valued species, smaller size, and lower quality. Again, without a change in market values, it is expected that the average stumpage revenues per thousand board feet will decrease from over \$600 to about \$400 due to these factors.

It is difficult to speculate on future market values for stumpage. Substitutes are entering the market in the form of alternate materials and imports of wood products, indicating that current stumpage values may be near maximum. Also, if mills close because of supply shortages, competition will decrease, resulting in a decrease in bid rates. However, if the economy improves and housing demands increase, increased demand may cause increases in prices for substitutes, as well as wood products. In the long-term, it is unlikely that log prices can be maintained at levels higher than the world market. The timber supply, or lack of timber supply, from the West Coast will have a minimal effect on world market log prices.

With revenues of \$400 per thousand board feet for stumpage, the Eldorado National Forest would have to harvest approximately 50 million board feet to generate \$20 million in receipts. Future timber sale and harvest levels are expected to be in the 50 to 75 million board foot range.

### Mill Closures

Mill closures have been accelerated by the shrinking supply of timber from federal lands. More than 40 percent of the mills on the West Coast have closed since 1980. In California,



37 mills have closed since 1990, including 16 of the 31 mills tributary to the Eldorado National Forest. Listed below are companies and tributary mills that have bid for timber on the Eldorado since 1990 (Baumbach 1994). Mills that have closed are also identified.

<b>Table 23. Companies and Tributary Mills for the Eldorado Since 1990.</b>		
Company	Location	Mill Closed
Bald Knob Land and Timber	Oroville	xx
Bohemia (sold to Sierra Pacific)	Grass Valley	xx
"	Lincoln	
Collins Pine	Chester	
Cornett Lumber	Oroville	xx
"	Placerville	xx
Croman Corporation	Ashland, OR	
Feather River Forest Products	Marysville	xx
Fibreboard Corporation	Chinese Camp	
"	Standard	
"	Wallace	xx
Georgia-Pacific Corporation	Foresthill	xx
"	Martell	
Hi-Ridge Lumber	Yreka	
Louisiana-Pacific Corporation	Oroville	xx
Marysville Forest Products	Marysville	xx
Sierra Pacific Industries	Camino	
Norby Lumber	Madera	xx
P & M Cedar Products	Pioneer	
Roseburg Lumber (Scott Timber)	Red Bluff	xx
"	Anderson	xx
"	Anderson	xx
Sequoia Forest Industries	Auberry	xx
"	Dinuba	
"	North Fork	xx
Sierra Forest Products	Terra Bella	
Sierra Pacific Industries	Lincoln	
"	Loyalton	
Sierra Timber Products	Gardnerville, NV	xx
Siller Brothers	Anderson	
Snider Lumber (sold to Fibreboard)	Wallace	xx
Trinity River Lumber (Schmidbauer Power Co.)	Weaverville	
Wetsel-Oviatt Lumber	Latrobe	

The Sierra Pacific Industries mill in Camino is the eighteenth largest mill in the nation, requiring 125 million board feet of logs annually to operate two shifts. The mill has been in operation for 105 years and generates an annual payroll of \$12 million for El Dorado County. The mill also provides \$1.9 million in health and payroll benefits and pays \$700,000 in payroll taxes. This mill, previously owned by Michigan-California Lumber Company, had been scheduled for closure in 1993 because of a lack of timber supply. For the same reason, Wetsel-Oviatt Lumber Company in Latrobe reduced operations in 1993 to one shift, laying off 30 workers. With the sharp decline in volume available from the Forest Service across California, further mill closures are likely.

### **Private Residences and Fire Risk**

The reader is referred to the Fire and Fuels section of this chapter for a description of risks of fire, both to and from private residences.

### **Public and Forest Worker Safety**

The reader is referred to the Fire and Fuels section of this chapter for a discussion of safety issues affecting the public and forest workers on and near Forest Service lands.

### **Socioeconomics and the Eldorado LRMP**

The Eldorado National Forest LRMP and associated EIS identify economic goals and objectives and discuss the economic and social environments affected by projects such as Whale Rock. The LRMP (4-3, 5) states that one Forest objective is sustaining long-term yield of logs and other wood products by practicing intensive timber management activities and by producing forest products and services in the most cost efficient way.

The Whale Rock project contains several thousand acres of productive forest land that is capable, available and suitable for the production of sawtimber and other timber products, including biomass. However, because of the availability of other energy sources, such as natural gas, the economics of electrical cogeneration from biomass is very marginal in today's market. The removal of biomass at current costs and within the current energy regulatory structure is best viewed as a sunk cost with no monetary return to the public in terms of this project.

The cost of preparing and harvesting the Whale Rock Project is included in the economic discussion of each alternative in Chapter 4.

## **SUMMARY**

This chapter discussed the existing conditions and affected environment within the Whale Rock project area. The chapter focused on the physical, biological, economic, and social conditions that may be affected by implementing the alternatives. This discussion provides a baseline for understanding and evaluating the environmental consequences of implementing the alternatives as described in the preceding chapter. The following chapter (Chapter IV) describes the environmental impacts associated with each alternative.



*Please use this page for notes.*

## CHAPTER IV

# ENVIRONMENTAL CONSEQUENCES

### INTRODUCTION

This chapter discloses the environmental and socioeconomic impacts of implementing each of the alternatives described in Chapter II. The consequences are organized by resource element under each alternative, and are discussed in the same order as described in Chapter III for the Affected Environment. The reader can refer to the present conditions of the environment by checking Chapter III, then assess how each alternative would change those conditions, and the degree to which each brings the landscape closer to the Desired Condition.

Environmental effects can be direct, indirect or cumulative. Effects might be adverse or beneficial, significant or insignificant, actual or potential, short term or long term, unavoidable, irreversible, or might conflict with the plans of other agencies. The following discussion describes these effects in three general categories – *direct effects*, or those occurring at the same time and place as the triggering action; *indirect effects*, or those occurring at a later time or distance from the triggering action; and *cumulative effects*, which includes an assessment of past actions coupled with the proposed action and any reasonably foreseeable actions in the area in the future.

The foreseeable future actions on Forest Service lands within Whale Rock include treatment of the units identified in the 1996 Vegetation Management in Conifer Plantations EA; precommercial thinning of a 25 acre plantation and 30 acres of natural stands; a roadside hazard tree removal project affecting approximately 5 acres and 25 MBF, an unnamed cable thinning sale in the vicinity of Rice Cabin that would harvest approximately 200 MBF; and the continued understory burning of approximately 160 acres every other year under the ongoing District prescribed burn program. On private lands owned by Sierra Pacific Industries, 1995 Timber Harvest Plans (THPs) and the 1995 herbicide treatments were recognized in the cumulative watershed effects calculations; no 1996 THPs have yet been approved. *All of the above projects, as well as all the past actions in the area which have contributed to the current conditions (private and Forest Service timber sales, road construction, residential construction, past fires, etc.), were considered in the cumulative effects analysis in each of the resource discussions in every alternative.* Since all the action alternatives replace the volume of the sold, but currently suspended, Cox Canyon Timber Sale with volume from the Whale Rock project, the effects of including Cox Canyon have been included in the analysis of Alternatives B through E. If the No Action Alternative (Alternative A) is selected, additional environmental analysis will be needed for the suspended Cox Canyon Timber Sale; this analysis would be entirely separate from the

Whale Rock EIS. There are no other known projects within the Whale Rock area that are currently approved in environmental assessments, decision memos or state harvest plans on either private or Forest Service lands.

It was appropriate for several resources to analyze effects beyond the geographic confines of the project area. For example, wildlife biologists considered the effects on the Pacific Deer Herd in conjunction with the effects from the adjacent Cleveland Fire, and economic effects which extend into the adjoining counties were analyzed. In instances where effects outside of the project area boundaries were considered, they are explicitly discussed.

This analysis complies with current management direction found in the Eldorado Land and Resource Management Plan (LRMP); Forest Service Regional policy, standards and guidelines; the National Environmental Policy Act (NEPA); and other relevant federal laws and policies.

## **ALTERNATIVE A: NO ACTION**

No activities would be undertaken in this alternative to reduce fire or safety hazards, or to improve the health of the watersheds, wildlife habitat or forest ecosystem.

Implementation of the No Action Alternative would not contribute to the attainment of the Desired Condition for the project area nor of any of the resource objectives for the proposed project. The No Action Alternative is described in greater detail in Chapter II.

Direct impacts from project-related activities would not occur to any of the resources in Whale Rock. However, because of the high fuel loading and areas of steep terrain, a high intensity, extensive wildfire is likely in this area sometime in the future (in fact, more than one third of the area has experienced stand-replacing fires in the last 30 years). If no management action is to take place, particularly fuels reduction, the likelihood of a large stand-replacing wildfire occurring is high. Therefore, the effects of a wildfire are discussed as a possible indirect effect of the No Action Alternative.

The direct, indirect, and cumulative effects of implementing this alternative are addressed below by resource area in the following order: geology and soils; hydrology; vegetation, biodiversity and timber; sensitive plants; fish and wildlife; snags and down logs; fire and fuels; air quality; visual resources; transportation; range; recreation; cultural resources; historical landscape; and socioeconomics.

## **GEOLOGY AND SOILS**

**Direct Effects:** No direct effects would occur to the geology or soils in the project area should the No Action Alternative be selected. This alternative would effect no increase or decrease in ongoing erosion within the project area. Soil displacement and soil



compaction would not directly increase under this alternative. No changes to soil cover and nutrient cycling would occur.

**Indirect Effects:** A result of not reducing fuel loads in this area would be an increase in the probability of a catastrophic wildfire, which would in turn result in indirect effects to the soil resource. In high intensity fires, a loss of soil cover, organic matter and downed logs leads to a reduced nutrient level in the soils as well as decreased water-holding capacities. Fire-induced water repellency, coupled with loss of vegetative cover, can lead to accelerated erosion and increased runoff rates. The result is a loss in soil and soil productivity, along with increased sedimentation into downstream rivers and reservoirs.

The presence of steep slopes, valley inner gorges, and historic mass movements clearly indicates the area's susceptibility to landsliding, primarily along the northern and western project boundaries. Increases in surface soil erosion, overland flow rates and water table levels can all contribute to mass instability. If an extensive wildfire were to occur, reactivation of old landslides and initiation of new ones could be anticipated in these unstable areas.

Under this alternative any opportunity to mitigate current degradation of soil and water resources would be precluded. Additional NEPA documentation and funding would be necessary to carry out identified rehabilitation projects, including opportunities to establish vegetative cover on compacted landings and temporary roads, and opportunities to reduce the chance of a high intensity fire that would increase erosion and decrease soil productivity.

**Cumulative Effects:** There should be very little net increase in soil loss or decrease in soil productivity resulting from selection of this alternative or any foreseeable future activities in the Whale Rock area, since Best Management Practices (BMPs) and erosion control measures will be applied to project activities.

## HYDROLOGY

The assumptions used to analyze hydrological effects are included in Appendix G.

**Direct Effects:** There would be no direct, project-related impacts to hydrologic functions in the Whale Rock analysis area under the No Action Alternative.

**Indirect Effects:** Without further disturbance, watershed recovery is a function of stream and slope sensitivity, the degree and duration of previous impacts, and the passage of time. Stream and slope sensitivity is a function of topography, geology, soils, vegetation, stream channel geomorphology and other related elements, all of which are essentially constant. The absence of project disturbance under Alternative A would

permit the current trend of recovery from past management practices to continue for all watersheds.

The potential indirect effects of a wildfire must also be considered in the discussion of the consequences of no action. The effects of wildfire are dependent upon a number of variables, including the intensity of the fire. A discussion of the extent and likelihood of a catastrophic, high intensity fire is presented in the Fire and Fuels section. High intensity burned areas exhibit characteristics such as loss of riparian area vegetation, loss of large organic material within stream channels, development of hydrophobic (water-repellent) soils, loss of ground cover and loss of canopy cover. Moderate or low intensity fires would display less severe effects. Evaluations of burned areas suggest that on a per acre basis, the hydrologic effects caused by a high intensity fire exceed the hydrologic effects of tractor clearcutting for the first 5 years (Kuehn and Coburn 1989), since wildfires generally affect an extensive contiguous area which burns uncontrolled through sensitive streamside zones, inner gorges, landslide areas and the like – areas which normally receive special protection measures in a planned project such as a timber sale.

A catastrophic fire in this area would produce higher peak flows and sediment loads that would be likely to cause culverts to block during normal storms and would also increase the possibility of road washouts. Potential for in-channel debris jams would increase, which would result in scouring of channels, possibly resulting in channel abandonment or culvert failure. Lack of riparian canopy would result in increased in-stream water temperatures. Reduced transpiration of vegetation coupled with weakened root systems would increase the potential for mass movement. Downstream beneficial uses of water would be negatively affected by an extensive fire. Reservoir storage and powerhouse functioning would be adversely affected by increased sediment loads. Fisheries and the aquatic ecosystem would be impacted by increased water temperatures and the sedimentation of pools and riffles; these impacts deplete spawning and rearing habitats. Recreation would be impacted by loss of shade, aesthetic beauty and by turbid flows following storms.

**Cumulative Effects:** In the worst-case scenario, a wildfire burning at high intensities within one or more of the watersheds within the project area could result in the modeled equivalent roaded acres (ERA) for the watershed exceeding the threshold of concern (TOC) by 200% or more. For example, on the Cleveland Wildfire, the South Fork of Silver Creek experienced a high or moderate burn intensity on 67% of the watershed. The resultant ERAs were 173% higher than the established TOC.

If a catastrophic fire were to burn the Whale Rock area, the potential cumulative watershed effects would be similar. For purposes of analysis, these effects were calculated for the Whale Rock area for a catastrophic wildfire occurring in 1997, the same year that harvest would be planned under the action alternatives. It was assumed that a catastrophic fire would burn within the entire project area, although the whole area would not burn at the same intensity and there would be pockets within the fire that would burn at a low intensity or not at all. Percentages of the area assumed to burn at

high or moderate intensities were based on data from the Cleveland Fire and from fires on neighboring forests, including five fires from the Stanislaus and the Stormy Fire from the Sequoia. Fire areas are assumed to burn at high intensities on 67% of the burn area and moderate intensities on 22%. The remainder of the areas are assumed to burn at low intensities. Cumulative watershed effects (CWEs) were calculated based on the percentage of each watershed within the project area that is likely to burn. These projected effects are arrayed below in Table 24. Appendix G contains a discussion of the assumptions, implications and limitations of the CWE model, which the reader should be familiar with prior to evaluating the data contained in the CWE tables.

<b>Table 24. Potential Cumulative Watershed Effects Resulting from a 1997 Catastrophic Wildfire in the Whale Rock Project Area</b>						
<b>Watershed</b>	<b>Established TOC (%)</b>	<b>%ERA - Present/Projected</b>				
		<b>1995</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2003</b>
Pacific House	10-12	5.1	4.9	10.6	9.2	7.4
Soldier Creek	12-14	12.4	11.3	25.4	21.9	17.0
Riverton	10-12	12.9	12.7	11.8	11.1	9.5
Lower Silver	10-12	7.0	7.2	15.1	13.2	10.6
Round Tent	12-14	7.3	20.6	17.3	15.3	11.8
Sunset	10-12	8.7	11.9	10.8	10.0	8.6
Jaybird	14-16	8.2	7.8	22.1	18.7	14.2

The primary reason for the disparity among the ERAs displayed above is related to the percentage of each watershed that is contained within the Whale Rock project area, as well as the size of each affected watershed. The smaller watersheds exhibit more noticeable effects, whereas larger watersheds have greater ability to absorb impacts since they are dispersed over a larger area. In addition, the calculated ERAs assume that the fire effects were added to the effects of previous watershed activities.

Implementing watershed restoration projects reduces the potential for adverse effects on downstream beneficial uses of water. If rehabilitation projects involve acres of compaction remediation, they can also reduce the modeled %ERA. The effects of most watershed improvement projects described in conjunction with Whale Rock can not be accounted for in CWE calculations. These benefits are instead discussed in the direct and indirect effects sections.

There would be no timber sale receipts generated for Whale Rock under this alternative, and further watershed improvement needs (WIN) inventory or work would be limited due to a lack of available funding. Funding of rehabilitation projects would be based on priorities established for watershed improvement dollars across the Forest. However, the watershed improvement work scheduled to occur under the Black Flag Insect Salvage Sale improvement plan would continue. Other projects currently approved within the Whale Rock project area would also continue, since the No Action Alternative



would not preclude other projects from proceeding. The effects of other scheduled projects are included in the determination of the rate of recovery for the included watersheds, which are displayed in Table 25. The data in Table 25 assumes the absence of a catastrophic fire.

<b>Table 25. Alternative A Cumulative Watershed Effects in the Absence of Catastrophic Fire</b>						
<b>Watershed</b>	<b>Established TOC (%)</b>	<b>%ERA - Present/Projected</b>				<b>2003</b>
		<b>1995 (present)</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	
Pacific House	10-12	5.1	4.9	4.9	4.8	4.7
Soldier Creek	12-14	12.4	11.3	11.0	10.8	10.2
Riverton	10-12	12.9	10.3	11.1	9.6	8.6
Lower Silver	10-12	7.0	6.5	7.0	6.8	6.6
Round Tent	12-14	7.3	6.5	6.4	6.3	6.0
Sunset	10-12	8.7	8.3	8.0	7.7	7.1
Jaybird	14-16	8.2	7.8	7.7	7.6	7.4

The above Table displays the existing 1995 %ERA including all other foreseeable actions. These numbers portray the decline in %ERA over time that is expected to occur should the Whale Rock project not proceed. Note that activities implemented in 1995 will not be apparent in the CWE model until the following year. Other activities not accounted for in the existing 1995 ERAs are displayed below (although these do show up in the projected ERAs for the outlying years):

Lower Silver Watershed:	Nutmeg Timber Sale
Riverton Watershed:	Cox Canyon Timber Sale Cleveland Fire Herbicides Sierra Pacific Industries 1995 Timber Harvest Plan Bull Plum Timber Sale Cleveland Fire Watershed Rehabilitation Projects
Sunset Watershed:	1995 Timber Harvest Plans (3) Powerline Corridor Treatments Herbicide Treatment
Soldier Creek Watershed:	Black Flag KV Plan WIN Projects

## VEGETATION, BIODIVERSITY AND TIMBER

There would be no direct effects upon vegetation, biodiversity or timber from implementing Alternative A. Therefore, in the discussion that follows, only indirect and cumulative effects are presented, except for the initial general discussion. The effects of catastrophic fire are described as an indirect effect, and because there are an infinite number of wildfire scenarios, the discussion presented is of a general nature. After the overview, indirect effects are described under the following subheadings: vegetation strata (size class and density); species composition; tree/stand age; stand density; late seral forests – occurrence, fragmentation, and connectivity; lava caps; rust resistant sugar pine; oak woodlands; and riparian areas. Short term effects are here assumed to be at the end of 5 years and long term effects at the end of 50 years.

### General Discussion

**Direct Effects:** Plant community composition and structure would remain unaltered, except by the processes of succession. The biodiversity of the analysis area, as measured in terms of genetic diversity, species composition, structural variability and community diversity, would remain relatively low as compared to the potential of the analysis area.

**Indirect Effects:** The indirect effects of implementing this alternative are different for existing plantations than for the natural stands.

### Plantations

Short-term indirect effects would be subtle. Average tree radial growth would be maintained at about 5 to 8 annual rings per inch and average height growth would continue at about 1.5 to 2.5 feet per year. Basal area growth would continue at about 2% per year. Current decreases in average annual diameter growth trends would continue, while the rate of height growth would remain unchanged. The overstory would continue to close, with resultant decreases in density of understory vegetation. There are likely to be only minor changes in tree numbers per acre. Some minor tree losses would continue to occur because of insect mortality. This minor mortality is most likely to occur as small patch kills that appear to be randomly distributed, although damage caused by snow breakage or other external events may attract insects to a particular area, resulting in additional tree loss.

Long-term effects would be obvious, particularly in terms of growth within unthinned plantations when compared to thinned plantations. Unthinned plantations would tend to become dense, relatively slow-growing pole-sized stands. In an attempt to maintain dominance in an overstocked situation, most trees would trade diameter growth for height growth. As a result, the individual trees would tend to be much smaller in diameter than similarly aged trees growing in a more open situation. Average radial growth would likely be about 15 to 20 annual rings per inch and average height growth about 1 foot per year. Individual trees would display less than normal stem taper, and

they would tend to be spindly in appearance. Basal area growth of 1-2% per year would be expected.

Branches on the lower 50-60% of trees that are not on the stand perimeter would die from lack of sunlight. A considerable number of trees would die and fall to the ground because of direct mortality caused by competition or because of individual and group kills caused by insects. Broken-tops and broken or stripped limbs caused by typical winter snow storms are common. Some insect damage or mortality would regularly be associated with this snow damage.

The ground vegetation would be fairly sparse and primarily consist of the more shade tolerant vegetation, although some sunlight-demanding brush species would thrive in openings caused by insect-induced tree mortality. Conifer regeneration would be limited to incense cedar and white fir.

### Natural Stands

Short-term effects of this alternative would be displayed as continued high levels of tree mortality in the suppressed and intermediate tree classes as well as moderate levels of mortality in the co-dominant and dominant crown positions. A great number of the shade tolerant, understory trees would continue to survive, although their growth rates would be extremely slow (20-30 annual rings per inch of radial growth and non-consequential height growth). There would be no major shifts in tree species or stand growth. Some individual trees that are in dominant crown positions would continue to grow well. However, insect mortality would continue to take substantial tolls on the shade tolerant species, even if they are in dominant or co-dominant positions.

Long-term effects of this alternative would be evidenced by stands wherein the number of suppressed trees have diminished substantially because of natural mortality caused by inter-tree competition. The overstory and mid-stories would have gone through substantial amounts of natural thinning. The lower and mid-canopy levels would largely be depleted of light demanding species, such as ponderosa pine. A few ponderosa pine would be present in the overstory.

The forest floor would generally be absent of regeneration because of heavy fuels and a deep duff layer, except in those areas where windthrow or insect caused tree mortality had sufficiently opened the stand to allow for the regeneration of shade tolerant species.

Diameter and height growth would vary greatly in the stand and be largely dependent upon crown position of the tree. Gross stand growth would be relatively high (700 BF per acre per year), but because of constant mortality throughout the stand, net growth would be approximately 500 BF per acre per year. Basal area of the stand would continue to increase, but at a relatively low rate of approximately 2.0 square feet per acre per year because of continued tree losses.



## Plantations and Natural Stands

**Cumulative Effects:** The harvest associated with the Cox Canyon Timber Sale will have minor effects on natural stands and plantations. In units 12 and 13 on the Cox Canyon Timber Sale, removal of overstory is planned on approximately 13 acres of plantations. Once the overstory is removed, the plantations will develop as described above in both the short and long term. Overstory will be removed from existing natural stands in Cox Canyon units 11, 15 and 16. The residual stands will develop as the natural stands described above when the overstory is removed. Once harvest has been completed in Cox Canyon unit 14, a 13-acre clearcut, the area will be planted to ponderosa pine and managed in a manner similar to the other young plantations within the project area. Unit 17, a 15 acre seedtree cut, is designed to naturally regenerate this stand. Once regenerated, the area will be managed as a young plantation.

### **Vegetation Strata (Size Class and Density)**

**Indirect Effects:** There would be no substantial change in the acreage of the various strata within the project area in the short term. However, some long term indirect effects are expected. Using the timber growth model *Forest Vegetation Simulator* (FVS) (a.k.a. *Prognosis*) and assuming an even aged distribution within the size class 3 strata, all of the 3N and 3G strata would be expected to grow into size class 4 within 30 years (Fites 1994). It is therefore safe to assume that with no harvests or fires within the project area, the amount of 4N,G strata would increase from 1,995 acres (14.1%) to approximately 8,832 acres (61%) within 50 years. All of the size class 2 strata will become at least size class 3 strata and some of the size class 2 strata will become size class 4 strata. All of the existing young plantations will become size class 3 strata. It would be expected that the only locations where size class 2 strata would occur are on those lands where conifers do not dominate, such as lands dominated by black or canyon oak, and brushfields through which conifers are emerging.

If a wildfire occurred, the vegetation strata shift would be toward an early seral state in the areas intensively burned. Under the No Action Alternative, fire behavior modeling reveals that a potential catastrophic fire could burn the entire project area. If such an event occurred, nearly 100% of the project area would become early seral strata consisting of brushfields and artificially reforested lands.

**Cumulative Effects:** The Cox Canyon Timber sale will remove 5 acres of 4G and 15 acres of 4N strata.

### **Species Composition**

**Indirect Effects:** There would be no change in the species composition in the short term. However, over a period of 50 years the domination of the stands by the shade tolerant species of white fir and incense cedar will continue. As the overstory shade-intolerant species continue to decrease, the percentage of total basal area will continue the on-going shift towards the shade-tolerant species. This shift will become more

significant as the existing shade-tolerant understory experiences improved growing conditions, as the scattered pine trees continue to succumb to the effects of insects and drought.

**Cumulative Effects:** The Cox Canyon Timber Sale will primarily remove ponderosa pine. In all overstory removal units the released understory includes a high percentage of planted or naturally regenerated ponderosa pine. In the seed step units, the species that regenerate will be primarily ponderosa pine. In the Cox Canyon clearcut (Unit 14), the species planned for planting is ponderosa pine. The net effect is that the species being perpetuated is the same species that is being removed.

### **Tree/Stand Age**

**Indirect Effects:** There will be no indirect effects to tree or stand age.

**Cumulative Effects:** The removal of trees that average approximately 150 years of age on the Cox Canyon Sale, and the releasing or regenerating of much younger trees, would have a very minor cumulative effect upon average stand age within the project area.

### **Stand Density**

**Indirect Effects:** As stands age, the number of trees per acre decreases as inter-tree competition occurs. The rate of decrease is dependent upon the age of the stand. Young stands tend to have greater absolute decreases in tree numbers in a given period of time compared to older stands.

Within a 5 year period it would be expected that the changes in stand density would be relatively minor for older stands, but quite substantial for very young stands. For example, records indicate that in a 5 year period an 80-year-old stand would, on average, experience about an 8% reduction in trees per acre, while a 20-year-old stand would experience a 20% reduction in that same period of time (Dunning 1933). Since most stands within the project area average about 80 years of age, an 8% reduction in tree numbers (27 trees/acre/5 yrs) in the size 3 or larger strata equates to approximately 322,000 dead trees in the short term. Since most of the trees lost from the stand tend to be those experiencing the greatest competition, many of those lost would be among the smaller members of the stand.

Over a 50 year period, the changes in stand density will be substantial. For example, approximately 80% of the trees in 30-year-old westside Sierra young growth stands will die by the time the stand reaches age 80 (Dunning 1933). For the stands in the project area that average 80 years of age, it is anticipated that about 40% (147 trees per acre) of the trees in size class 3 or larger strata will die prior to age 130 (Dunning 1933). On the project area this equates to approximately 1,750,000 dead trees in the long term. Again, the majority of the trees that die would be the smaller members of the stand.

If a wildfire occurred, stand density would be dramatically changed in areas intensively burned. Most stands would be entirely eliminated, while a few stands would have a few scattered surviving trees.

**Cumulative Effects:** No measurable cumulative effects upon overall stand density are anticipated within the project area.

### **Late Seral Forests**

**Indirect Effects:** There will be a change in late seral forest habitat as an indirect effect of the No Action Alternative. Refer to the Vegetation Strata section, above, for a discussion of the changes in timber strata related to late seral forest conditions.

If a wildfire occurred, the vegetation strata shift would be toward an early seral state in the areas intensively burned. Under the No Action Alternative, fire behavior modeling reveals that a potential catastrophic fire could burn the entire project area. If such an event occurred, nearly 100% of the project area would become early seral strata consisting of brushfields and artificially reforested lands. Late seral forest conditions would require the passage of 100 or more years. The amount of time required to re-establish late seral forest conditions would be dependent upon future reforestation choices and management decisions, but the passage of decades would be unavoidable.

**Cumulative Effects:** The Cox Canyon Timber Sale will not reduce the amount of 4N,G strata within the analysis area. Late seral conditions are not present on private land, according to the Eldorado Forest data base, thus there would be no effect from taking no action.

### **Fragmentation of Late Seral Forests**

**Indirect Effects:** There would be no measurable differences in the amount of late seral habitat fragmentation in the short term. In the long term, the increase in the amount of late seral habitat would reduce the amount of fragmentation currently present within the project area. With over 60% of the project area in a late-seral condition in 50 years, late seral conditions would tend to dominate, and fragmentation would be associated primarily with the early and mid-seral types.

If a wildfire occurred, the vegetation strata shift would be toward an early seral state in the areas intensively burned. Late seral forest conditions would suffer severe fragmentation because of the establishment of large blocks of land supporting early seral conditions. Under a No Action Alternative, fire behavior modeling reveals that a potential catastrophic fire could burn the entire project area. If such an event occurred, nearly 100% of the project area would become early seral strata consisting of brushfields and artificially reforested lands. The fact that the Cleveland fire area would be adjacent to this additional burn area would add to the severity of the fragmentation, as essentially all the uplands on a 30,000-40,000 acre block of land could be in an early seral state. Re-establishment of late seral forest conditions would require the passage of 100 or more years. The amount



of time required to re-establish late seral forest conditions would be dependent upon future reforestation choices and management decisions.

**Cumulative Effects:** The areas to be harvested on the Cox Canyon Timber Sale represent isolated late seral stands that will not contribute to fragmentation. Late seral conditions are not present on private land, according to the Eldorado Forest data base, thus there would be no effect in those areas from taking no action.

### **Late Seral Forest Connectivity**

**Indirect Effects:** There would be no measurable differences in the amount of late seral connectivity in the short term. In the long term, the late seral corridors would cease to be recognizable as corridors due to the expansion of the total amount of late seral habitat within the project area. Existing corridors along the riparian zones and along the perimeter canyons of the project area would unite with the expanding late seral stands that would dominate the project area.

If a wildfire occurred, the vegetation strata shift would be toward an early seral state in the areas intensively burned. Late seral forest conditions would suffer severe connectivity breaks because of the establishment of large blocks of land supporting only early seral conditions. If 100% of the project area burned in a catastrophic fire, effects to late seral connectivity would be the same as those described above for late seral fragmentation.

**Cumulative Effects:** The areas to be harvested on the Cox Canyon Timber Sale represent isolated late seral stands that are not associated with any corridors. Late seral conditions are not present on private land, according to the Eldorado Forest data base, thus there would be no effect.

### **Lava Caps**

**Indirect Effects:** In the short and long term, there would be no noticeable change to the lava cap plant communities. These diverse plant assemblages would continue to support stands of stunted incense cedar and brush. These areas exist as a fire adapted plant community, subject to intermittent fires. Between fires, this community is often overtaken by shrubs, stunted trees, and in recent years, exotic weed species, such as *Scleranthus annuus* and *Erodium spp.* (filaree). These successional cycles are expected to continue with only minor changes.

**Cumulative Effects:** The other projects within the analysis area will not affect the lava caps and there will be no cumulative effects from these projects.

### **Rust Resistant Sugar Pine**

**Indirect Effects:** No changes are expected in the short term. In the long term, the dense understory of existing white fir and incense cedar will preclude the natural regeneration of sugar pine. The existing rust resistant trees are expected to continue to survive; however, few offspring will regenerate.

If a wildfire occurred, there would be a great likelihood that some if not all of the rust resistant sugar pine would be killed. The elimination of what appears to be a high density of rust resistant sugar pine would be an important loss economically and, if the presence of these sugar pine represent a unique genotypic population, their absence could be important ecologically.

**Cumulative Effects:** No other activities are planned near rust resistant sugar pine and there will be no cumulative effects from other projects.

### **Oak Woodlands**

**Indirect Effects:** In the short term there will be no measurable changes. In the long term, regeneration of black oak would continue to be poor. Since black oak is a sunlight demanding species, it will tend to diminish in abundance and extent under the No Action Alternative as conifer stands continue to achieve increased crown closure and site dominance. In addition, the accumulation of increased duff layers would also preclude oak regeneration. Canyon live oak dominates certain areas in the steep canyons of Silver Creek and the South Fork of the American River. It is expected that on these steep slopes and shallow soils, canyon live oak has an ecological advantage over the competing conifers and will not greatly diminish. Over a 50 year period it is expected that the basal area of black oak would decrease from its current 7% representation within the project area.

A catastrophic fire would be likely to topkill many, if not all, standing oak trees. Regeneration sprouting usually results after a topkill; however, root sprouts often result in short lived and poorly formed trees, because of the number of resulting sprouts and the fact that rot usually manifests itself in the regenerated stump, causing the resulting trees to break off at a young age.

**Cumulative Effects:** There are no other activities planned that will affect oak woodlands in terms of cumulative effects.

### **Riparian Areas**

**Indirect Effects:** There would be no measurable change in the size or character of riparian areas, other than those vegetative changes previously presented.

In a catastrophic fire event, riparian areas are routinely damaged or destroyed. Though these areas are often wetter than the surrounding uplands, they dry out in late summer and early fall, and the high quantities of accumulated dead vegetative material makes

these areas susceptible to intense fires. Within the Whale Rock project area are numerous riparian areas with high tonnages of down and standing dead vegetation, similar to tonnage levels within the riparian zones that were severely affected by the Cleveland wildfire.

**Cumulative Effects:** Riparian areas will receive protection under the other foreseeable future projects within the analysis area and there will be no cumulative effects.

## SENSITIVE PLANTS

**Direct Effects:** Alternative A would not directly alter conditions for the known sensitive plant species found in the project area. The structure and function of sensitive plant communities would be unaltered, except by the process of plant succession.

**Indirect Effects:** The habitat for Pleasant Valley mariposa lily and yellow bur navarretia may suffer negative effects because of the continued growth of manzanita, wild cherry, silktassel and trees which encroach on the sensitive plant habitat. The action of fire to periodically remove shrubs and young trees improves the habitat for most herbaceous plant species, including these sensitive plants. The exclusion of fire in these natural communities is suspected to have had a negative effect on Pleasant Valley mariposa lily and yellow bur navarretia.

By not treating the existing fuel load in the forest, the risk of a large stand-replacing wildfire increases. A stand-replacing fire would sweep through sensitive plant areas and tend to improve and temporarily enlarge the habitat for three of the sensitive plants (Pleasant Valley mariposa lily, yellow bur navarretia and Stebbins' phacelia; it is not known how fire affects saw-toothed lewisia). The amount of available light, soil moisture, and nutrients may be much increased by fires, stimulating certain plants like Pleasant Valley mariposa lily to vigorous production of primary leaves, an increase in numbers of flowering individuals, and higher seed production. A stand-replacing fire would also stimulate the growth of unknown populations of sensitive plants by releasing the habitat from competition from shrubs.

Although the occurrence of a large wildfire would initially bring some beneficial effects to sensitive plants, adverse effects might be expected as well. After a large fire and subsequent vigorous shrub regrowth, the habitat will eventually be reclaimed by species other than sensitive plants, including exotic plants which could be introduced to the habitat during fire rehabilitation activities. In addition, erosion and runoff, combined with the initial loss of vegetation from the fire, might wash out or dislodge sensitive plant populations in the steeper canyons.

Sensitive plant sites might also be adversely affected by firefighting, suppression and rehabilitation activities. Fire line construction, by hand or mechanical equipment, and the possible proliferation of exotic weed seeds during such rehabilitation activity, may negatively affect some plant species.



**Cumulative Effects:** The other projects within the analysis area would have no effect upon sensitive plants, and the No Action Alternative is not likely to contribute to any adverse cumulative effects.

## FISH AND WILDLIFE

**Direct Effects:** There will be no direct effects to fish or wildlife from Alternative A. In the short term, habitat capabilities will remain in the same condition that is currently present throughout the area. Wildlife and fish species in the area will not suffer direct disturbance, as no project activities will occur.

**Indirect Effects:** Although there are no activities planned for Alternative A, the indirect effects to fish and wildlife may be great. This alternative would result in the continuation of ongoing processes throughout the area; the most serious result would be the continued heavy accumulation of fuel, both on the ground and in fuel ladders. This significantly increases the risk of a large scale, catastrophic fire. Such a fire would destroy habitat for all species present in the project area. The loss of suitable habitat may displace individuals to other areas, increasing competition within or between species. A catastrophic fire would also affect fisheries. Damage from wildfire to watersheds contained in the project area would increase siltation to the South Fork American River, Silver Creek and Soldier Creek. Sedimentation in streams would affect fish habitat for both feeding and spawning (Kaczynski 1994). In addition, high intensity fires have burned sufficiently hot that entire populations of fish have been boiled to death (O'Carroll 1994:1; Knudson 1994).

Apart from the risk of catastrophic fire, there would still be indirect effects to wildlife habitat resulting from the lack of management activities in the area. Most of the forested stands in the area are in the mid-seral state with a dense understory of pole-sized trees. These overstocked stands will be slow to mature to late seral stages. There is also increased chance of insect caused mortality, not only to pole and medium sized trees, but to large, old growth trees. The dense understory impedes movement for both early seral species, such as deer, and late seral species, such as northern goshawks and spotted owls. Brushfields that occur throughout the area will continue to degrade, providing low quality forage for wintering deer.

Any natural fires that occur in Whale Rock will be suppressed as quickly as possible. This may have other, as yet unknown, effects on the local wildlife. For example, the highest extinction rate for mammals in the world is in an area of Australia where forest fire suppression as a policy has replaced the use of prescribed fires by aboriginal peoples (Averhill et al. 1994:20). Whether similar effects can be expected in the Whale Rock area over the long term is not known.

**Cumulative Effects:** The cumulative effects of Alternative A would mainly be tied to conditions in the Cleveland Fire area, just east of the project area. In the event of a catastrophic fire in the Whale Rock area, the cumulative loss of wildlife habitat would be devastating. Approximately 13% of the Pacific Deer Herd critical winter range was

burned in the Cleveland Fire. If a fire occurred in the Whale Rock area, another 21% of the winter range would be destroyed. Forage levels within burned locations return quickly, but there will be a lack of thermal and hiding cover. The absence of overstory cover and increased snow depth would make much of the winter range unusable.

Habitat for at least three pairs of spotted owls was affected by the Cleveland Fire. Potential for the loss of habitat through fire exists for an additional seven pairs in the Whale Rock area. All other species present in the project area are threatened with being displaced due to the destruction of habitat through fire. If a stand-replacing fire occurs throughout the entire Whale Rock area, a barrier eleven miles wide will be created for most wildlife species.

Assuming a catastrophic fire does not occur in the Whale Rock area, there will still be a cumulative effect on habitat. Without management, the project area will continue to provide only moderate to low habitat capabilities for all wildlife species evaluated, with the exception of mountain quail. This poor quality habitat, combined with the low quality habitat within the Cleveland Fire area, will adversely affect wildlife habitat for decades to come.

## SNAGS AND DOWN LOGS

**Direct Effects:** Short term and long term direct effects upon snags and down logs would not occur under this alternative. Existing snags and down logs would remain in their present number. The recruitment rate of snags and down logs would continue to be dependent upon the interplay of precipitation levels, stand density and other natural elements, such as the incidence of insect attack or amounts of windthrow.

**Indirect Effects:** Short term and long term indirect effects on snag numbers would occur. The existing snag and down log numbers, higher than those considered within the natural range of variability, contribute to increased fuel loadings and wildfire risk. A catastrophic fire would create tremendous additional numbers of new snags while consuming existing snags and down logs. The probability of this occurring is greater in the long term than in the short term.

Additional long term effects are likely, but difficult to predict. The general upward trend in snags and down logs measured since 1990 would continue until conditions suitable for tree growth improve. This change could occur with increased rainfall levels or less competition for the available moisture.

**Cumulative Effects:** Foreseeable future projects within the analysis area will have no effect upon existing snags and down log numbers, because projects either do not involve the removal of dead trees, or the snags and down logs will be protected.

## FIRE AND FUELS

**Direct Effects:** No activities will occur in Alternative A, and fuels will not be treated to reduce the risk of catastrophic wildfire. Fuel loads will continue to increase if this alternative is implemented. Fire suppression practices will continue when wildfires occur for protection of resources, improvements and public safety.

As a direct result of excluding fire, both the live and dead fuels have built up to very high levels over the last 80 years. Implementing this alternative will result in 97% of the project area remaining in a high fire hazard condition.

**Indirect Effects:** All areas will tend to increase fuel loadings naturally over time. These areas already have an unacceptable risk of stand-destroying wildfire. Wildfires occurring in the area will continue to be suppressed, with the goal of containing them to less than 10 acres in size. This goal will become increasingly difficult to meet due to the accumulation of fuel which adds to resistance to control, increased rate of spread, and potential for crown fires. For example, comparisons of timber volumes saved by fire suppression in the western United States versus the volume consumed by wildfires show that all the timber volume saved during the last 70 years of fire fighting was lost in four recent fire seasons (Auclair and Bedford 1994:254-261).

If the fire history experienced during the last 18 years continues, an increase of 400% in fire starts by people can be expected. With the increase in fuel loads, the largest probable catastrophic fire in the area can be expected to consume essentially the entire project area, or roughly 17,885 acres (see Appendix F).

Implementing this alternative would mean that no hazard trees (snags) would be felled, thus perpetuating the risk of serious injuries or fatalities to firefighters. High snag and down log levels are forcing firefighters to employ indirect attack methods when suppressing fires. This fireline strategy is not the preferred method of attack because it violates several fireline safety practices and exposes firefighters to additional risks. It also expands the final size of each wildfire considerably.

Wildfire will be the only means of reducing the fuelbed under this proposal. Currently, wildfires burn with very high intensities throughout this area and are extremely difficult to control. Over the last 36 years, approximately 2,010 acres of forest in the project area have disappeared each decade due to wildfire. The acres burned would be type converted to brushfields or even-aged plantations that are extremely difficult to protect from stand-destroying wildfire.

Since no activities would be undertaken in this alternative to reduce fire or safety hazards, the risk of fire from and to residential developments within Whale Rock would remain high. Fire suppression practices would continue when wildfires occur for protection of resources, improvements and public safety. However, the goal of containing fires to less than 10 acres in size would become increasingly difficult to meet.



**Cumulative Effects:** The only project that has a favorable effect on the existing fire hazard inside the Whale Rock area is the District prescribed burning program. Over the last 17 years, approximately 2,000 acres have been prescribed burned at least once in the project area. Although this program has the potential to significantly reduce the fire hazard, it has not been as effective as it could be due to the inconsistency in funding, which is not likely to change in the foreseeable future. It is likely, however, that 160 acres will be understory burned every other year under this program within the Whale Rock area.

## AIR QUALITY

**Direct Effects:** No increase in PM 10 (particulate matter 10 microns or larger in size) will be produced from prescribed burning under this alternative. No increase from fugitive dust or equipment emissions will occur.

**Indirect Effects:** Under this alternative, no opportunity to reduce the fire hazard will occur and forest fuels will continue to build up. There has been an increase of 400% in fire starts by people during the last 18 years. This trend is likely to continue, and with the increase in fuel loads, fires can be expected to be larger, with air quality continuing to degrade. The largest probable catastrophic fire in the area can be expected to consume essentially the entire project area, or roughly 17,885 acres (see Appendix F).

An increase in PM 10 material will occur over time from wildfires. If the entire project area burned from wildfire, the following emissions would be produced during an estimated time of 1 to 3 weeks: PM 10 – 13,931 tons; carbon monoxide – 105,555 tons; methane – 4,311 tons; and non-methane emissions – 3,357 tons. This would be the equivalent of approximately the same volume of smoke released from all of the wood stoves and fireplaces in the Pollock Pines area for the next 190 years. Overexposure to PM 10 and carbon monoxide in smoke can create health problems. Wildland firefighters are at a much greater risk from smoke than the public, since they are often in dense smoke for long durations of time.

During the flaming phase of a catastrophic wildfire, air quality degradation could exceed Federal and State standards as far as 50 miles downwind of the event. During the smoldering phase, degradation of air quality could be affected for 10 miles downwind. At night, with the diurnal wind change, air quality could be affected for 30 miles down canyon from the source as the night inversion traps the smoke below it.

**Cumulative Effects:** The only cumulative effects expected in this alternative are associated with the current understory burn program of roughly 160 acres every other year in the Whale Rock area. The emissions from this burning, which would be spread over a three week period throughout the year, would be negligible.

## VISUAL RESOURCES

**Direct Effects:** Alternative A would have no direct effect on visual resources as observed from the affected viewsheds of Highway 50 and the South Fork of the American River. Any reduction or enhancement to the existing scenic quality from proposed project activities would not occur. Existing visual conditions of altered areas will continue to improve as the trees grow in the plantations and in other previously harvested areas. These areas will become less noticeable and more natural appearing.

**Indirect Effects:** This alternative could have an indirect effect on the scenic resource through damage to vegetation in the event of a catastrophic fire.

**Cumulative Effects:** This alternative would not contribute to the visual impacts of past or current project activities along the Highway 50 and South Fork of the American River viewsheds. If a large fire did occur, it would cumulatively add to the observable fire scars of the previous wildfires along the Highway 50 corridor, thus impacting the visual quality within the area.

## TRANSPORTATION

**Direct Effects:** There would be no new construction or reconstruction of roads under Alternative A. Normal routine maintenance would occur based on current maintenance levels. No non-system roads would be obliterated. There would be no direct impacts to road surfaces due to log hauling and biomass removal activity. There would be no increase in hazards because there would be no increased logging traffic.

**Indirect Effects:** There would be no surface replacement deposits collected for road maintenance and repair. Soil erosion associated with any non-system roads not obliterated would continue. Any roads identified as needing reconstruction for resource protection that would be funded by the project and not by normal routine maintenance would be deferred. Hydrologic effects of a catastrophic wildfire would greatly increase the runoff into streams and drainages. Existing culverts would then have to be replaced with larger pipes to accommodate the increased flows.

**Cumulative Effects:** Development of the area's transportation system would not be completed under the No Action Alternative. Access for forest projects would be limited to the existing road system, thus isolating some areas in need of fuels reduction work and potential fire suppression activities. Non-essential roads would not be obliterated or returned to a vegetated condition.

## RANGE

**Direct Effects:** Under Alternative A, brushfields will continue to become less available and less palatable to livestock.

**Indirect Effects:** The conditions described under the direct effects will continue. However, if a catastrophic fire occurred, an increased amount of forage would be available for a 5 to 10 year period as brushfields regenerate from previously timbered areas. After 5 to 10 years, the brushfields would again become less accessible and unpalatable to livestock.

Dead and dying trees will continue to fall. In time, the density of down material on the ground would become a barrier impeding livestock movement and distribution.

**Cumulative Effects:** There would be no foreseeable cumulative effects to range.

## RECREATION

**Direct Effects:** The limited recreational use of the area would continue at current levels. There would be an increased public safety hazard posed as more snags developed across the landscape.

**Indirect Effects:** Pedestrian access will become increasingly limited over time as brushfields and natural stands of trees become more dense, and as dead and down materials increase. Should a large, stand-replacing fire occur, it is expected there would be a dramatic reduction in most types of recreational use of the area as a direct result of damage to visual resources and water quality. Salvage logging after a large fire would further reduce recreational activities. Catastrophic fire damage would likely lead to closure of many roads now open to OHV use in order to limit further damage to the watershed. Mushroom collecting, however, would increase for several years following a large fire, after which this use of the area would decline. Hunting opportunities within the first 5 years after a large fire would increase, primarily as a result of decreased cover for target species.

**Cumulative Effects:** There would be no foreseeable cumulative effects from implementing Alternative A.

## CULTURAL RESOURCES

**Direct Effects:** No direct effects from project activities will occur to cultural resource sites as a result of implementing this alternative.



**Indirect Effects:** Under Alternative A, few mechanisms will exist to address or mitigate damage which has occurred from prior activities or which continues from current activities, such as recreational use. Damage and impacts were previously noted during site recording on roughly two-thirds of the sites. Most site degradation was noted as light to moderate, resulting primarily from logging and erosion. Other agents of degradation observed on sites include rodent burrowing, vandalism, dispersed recreational camping, deposition, fire, and construction projects. Twenty-four percent of the identified sites are currently considered to be in excellent condition (100 to 90% intact), 18% are in good condition (90 to 50% intact), 16% are in fair condition (50 to 10% intact), while 13% are considered to be in poor condition (less than 10% intact). The condition of the remaining 27% are unknown at present, as most were recorded decades ago without notation of site condition. Those impacts previously noted on sites would continue, although no damage directly resulting from management activities would occur. Impacted sites can be expected to continue to degrade without some sort of intervention or management.

Since no activities would be initiated to reduce fuel loads under this alternative, the risk of a large stand-replacing fire is another potential indirect threat to sites. In areas where wildfires occur, the most significant impacts to cultural resources result from fire suppression activities, particularly by heavy equipment cutting suppression lines. In the adjacent Cleveland Fire area, 20% of the known sites were damaged during suppression efforts. Additional post-fire impacts can result from accelerated erosion, soil loss and windthrow.

**Cumulative Effects:** Potential effects to sites from other projects have been, or will be, avoided. Only those effects noted under indirect effects would be expected to continue.

## HISTORICAL LANDSCAPE

The historical landscape reflects to a large degree the Desired Condition for Whale Rock. Assessing the effects each alternative would have on the historical landscape is therefore one way to measure each alternative's potential to achieve the Desired Condition. Historically, the Whale Rock area was more open than at present, with less dense and more wide-spread stands of pine, more stands of black oak, and less occurrence of incense cedar and fir. This open landscape is believed to have been maintained to a large extent by Native American burning practices.

**Direct Effects:** There would be no direct effects on the historical landscape of Whale Rock from implementing Alternative A.

**Indirect Effects:** Since no actions will be taken to reduce fuel loads in Whale Rock under this alternative, the risk of a large stand-replacing fire is high. If a large-scale catastrophic fire occurs, the landscape in Whale Rock will move even further from the historical landscape and Desired Condition for the area.

Several areas in Whale Rock, notably the southwest portions of the analysis area south of Rice Cabin, already approach the Desired Condition and historical landscape. This area has been systematically prescribed burned since 1978 (in 1978, 1979, 1985 and 1992). This parklike area of the forest has a low understory, primarily of bear clover, with wide, open spacing between trees. It should be noted that a similarly treated area on Icehouse Road near the Cleveland Corral Information Center was one of the only areas to survive the Cleveland Fire. As one drives up Icehouse Road, this is the only area in the lower South Fork American River Canyon within the burn that is still green and still timbered. The wall of 200-foot flames, common in the Cleveland Fire, dropped to a height of 4 feet when it reached this previously prescribed burned area. Immediately after passing through the treated area, the fire regained its momentum and intensity, consuming all the untreated, overstocked stands in its path.

Implementing this alternative provides no opportunity to study burning patterns on a landscape level in the project area, nor to conduct research regarding sustaining forest health throughout the wildfire-prone forests of the west (cf. Covington et al. 1994).

**Cumulative Effects:** The effects noted above will continue, with the risk of fire increasing over time. The shift from fire-tolerant to fire-intolerant species will continue in the Whale Rock area, resulting in an increase in the number of high intensity stand-replacing wildfires. As fire-adapted pine is replaced with fire-intolerant fir, forested stands will become increasingly susceptible to insects and disease (Averhill et al. 1994:22; Arno 1988:135).

## SOCIOECONOMICS

The socioeconomic values, both in dollars and employment, associated with the implementation of each alternative are displayed in Table 26. The discussion of the socioeconomic effects for the remaining alternatives is presented in the Effects section for the respective alternative. The timber products resource is the only resource assigned monetary value. Other resource values, such as wildlife, wildlife habitat, watershed and viewshed condition are considered in qualitative terms in other sections of this document.

**Direct Effects:** Implementing the No Action Alternative would prevent any further public funds from being spent for the planning or execution of this project. The estimated \$144,000 already spent for planning would be a sunk cost. This alternative would generate no receipts to the federal treasury or to the local counties from the sale of forest products. Opportunities for direct employment in harvest and sawmill operations would not occur. Income taxes generated by wages from employment, and sales and property taxes associated with harvest and manufacturing, would not be realized. The significance of these effects can be determined by comparison with the other alternatives. Forest Service employees involved in this planning process would move on to other projects and begin new planning efforts.

**Indirect Effects:** The indirect effects of foregone employment opportunities and reduced indirect taxable incomes are displayed in Table 26. The indirect effects of reduced county receipts from the Twenty-five Percent Receipts Fund Act would be measured in terms of reduced local community benefits, affecting the quality of education and standard of county road maintenance. Reduced county income might necessitate an increase in local taxes or changes in local budget priorities.

No other forest health projects are planned for this area during the next decade. Since this alternative does not propose to reduce the size or incidence of small or catastrophic wildfires, it could be assumed that existing wildfire trends will continue and that suppression costs will be incurred and resource damages will continue. Since 1957, about 2,000 acres per decade have been burned by wildfire within the Whale Rock project area. The averages are somewhat deceiving since there are numerous small fires annually, but this small fire regime is punctuated about once every 5 to 7 years with stand replacement fires. In the last 36 years, portions of four stand replacement fires have occurred within the project area. District fire and fuels professionals believe that there is a high probability of a catastrophic fire consuming nearly 18,000 acres within this area in the next 30 years, unless there is a significant reduction in amounts of live and dead fuels in the project area.

It would be expected that suppression costs of \$1,000 per acre would be incurred if a catastrophic fire did occur, hence total suppression costs would equal \$18,000,000. By comparison, the 1992 Cleveland Wildfire also cost approximately \$18,000,000 to suppress. In addition to suppression costs, losses to resources and improvements should be considered. Most monetary losses on forest fires pale in comparison to lost or foregone future timber values. These lost future values occur because of the losses of large numbers of trees that are not or are barely merchantable. The loss of these smaller trees that have little salvage value is in reality a loss of future value. On the Cleveland Fire this loss of future timber value was estimated at \$10,000 per acre. Using this estimate of \$10,000 an acre, a potential cost of an additional \$180,000,000 could be realized under this alternative.

**Cumulative Effects:** The Eldorado National Forest's timber program has been declining because of changes in policy and program priorities. Though the size of the timber program has been curtailed, emphasis has been placed on the offering of cost-effective projects that maintain some level of harvest while improving forest health. Projects such as Whale Rock require high upfront investments of time and money for planning and environmental analysis. The No Action Alternative would result in this process ceasing without accruing any economic benefits. A decision not to sell any forest products from this project area, coupled with the fact that planning for other equivalent projects is not complete, would have a substantial negative cumulative effect upon the local timber industry. The general absence of other National Forest timber sale offerings, combined with no offering from this project, would exacerbate the local and regional problems associated with mill closures and unemployment.



Table 26. Whale Rock Project Economics	ALTERNATIVE				
	A	B	C	D	E
VOL (MBF)	-	22,426	12,964	6,415	19,492
BIOMASS (TONS)	-	67,169	31,895	17,240	49,565
HARVEST ACRES	-	4,657	2,548	1,524	3,679
ACRES PRESCRIBED BURNED	-	6,303	5,623	1,765	4,510
HARVEST ACRES MACHINE PILED	-	1,024	462	240	777
FUELBREAK ACRES	-	914	-	-	914
<b>PREDICTED COSTS</b>					
COST OF PROJECT THRU EIS (\$) <sup>1</sup>	144,000	144,000	144,000	144,000	144,000
COST OF PROJECT PREPARATION (EIS THRU SELL) <sup>2</sup>	-	448,520	259,280	128,300	389,840
COST OF ADMINISTERING PROJECT <sup>3</sup>	-	184,987	105,204	52,423	158,581
ROAD COSTS, NEW CONS/RECONST <sup>4</sup>	-	927,125	541,300	424,720	975,785
PRESCRIBED BURNING COSTS <sup>5</sup>	-	1,355,590	1,306,420	389,650	960,445
SLASH CLEAN-UP (POST-PROJ MACH PILE COSTS) <sup>6</sup>	-	256,000	115,500	60,000	194,250
FUELBREAK MAINTENANCE COSTS <sup>7</sup>	-	45,700	-	-	45,700
SUBTOTAL COSTS	144,000	3,361,922	2,471,704	1,199,093	2,868,601
<b>PREDICTED RECEIPTS</b>					
RECEIPTS: 75% RETURN TO US TREASURY <sup>8</sup>	-	3,926,813	2,291,625	1,094,494	3,468,375
RECEIPTS: 25% FUND TO COUNTIES <sup>9</sup>	-	1,308,938	763,875	364,831	1,156,125
SUBTOTAL RECEIPTS	-	5,235,750	3,055,500	1,459,325	4,624,500
<b>PREDICTED TAXES</b>					
FEDERAL INCOME TAX (15%) <sup>10</sup>	-	745,945	420,537	210,339	634,776
CALIFORNIA INCOME TAX (3%) <sup>11</sup>	-	149,189	84,107	42,068	126,955
CALIFORNIA YIELD TAX (2.9%) <sup>12</sup>	-	151,837	88,610	42,320	134,111
SALES AND PROPERTY TAX (5%) <sup>13</sup>	-	289,217	162,221	81,317	245,061
TOTAL TAXES	-	1,336,188	755,475	376,044	1,140,902
<b>PREDICTED EMPLOYMENT</b>					
LOGGING AND SAWMILL EMPLOYMENT <sup>14</sup>	-	135	75	38	114
FOREST SERVICE AND LOCAL GOV'T <sup>15</sup>	-	45	26	13	39
INDIRECT EMPLOYMENT <sup>16</sup>	-	112	65	32	97
TOTAL EMPLOYMENT	-	292	166	83	250
<b>PREDICTED TOTAL ECONOMIC ACTIVITY AND PERSONAL INCOME</b>					
TOTAL ECONOMIC ACTIVITY <sup>17</sup>	-	5,784,346	3,244,422	1,626,332	4,901,212
TOTAL PERSONAL INCOME <sup>18</sup>	-	4,972,968	2,803,579	1,402,262	4,231,839

<sup>1</sup>Footnotes on next page.

## Footnotes for Table 26 (Whale Rock Economics):

- <sup>1</sup> This is the estimated cost of all Forest Service people involved in this project through completion of the EIS.
- <sup>2</sup> This is the cost of performing field layout, including cruise-marking, and contract preparation, appraisal, and contract award. Estimated cost is approximately \$20/MBF (including biomass).
- <sup>3</sup> This estimate includes sale and road inspection costs of \$7.50/MBF and \$0.25/ton of biomass.
- <sup>4</sup> This cost is normally viewed as an investment in which case the cost would be amortized over the 20 year life expectancy of the road, rather than a simple cost to project. For this project, all the costs are assigned to the project.
- <sup>5</sup> Prescribed burning costs are \$250/acre for prescribed burning and \$35/acre for machine pile burning. Those alternatives requiring prescribed burning over large numbers of acres without a prior harvest entry may require additional burn entries over as many as 3 burn cycles to remove all fuels. These costs are not reflected here as they are not included in this project, which covers a burn cycle of only 7 years after harvest is initiated in an area.
- <sup>6</sup> Machine piling costs are estimated at \$250/acre.
- <sup>7</sup> This is the cost to maintain fuelbreaks that would be established under the various alternatives. The work would be accomplished with a tractor/disc combination. It is assumed that one entry during the next decade would be needed at a cost of \$50/acre.
- <sup>8</sup> This is the return to the U.S. Treasury. The 25% receipts to the counties have been deducted from the gross receipts to the Treasury to arrive at this value. The values are derived on the basis of \$275/MBF for sawtimber and a negative \$200/acre for biomass.
- <sup>9</sup> This is the return to the counties via the 25% Receipts Fund Act. See footnote 8, above.
- <sup>10</sup> This value represents 15% of total economic activity.
- <sup>11</sup> This value represents 3% of the total economic activity.
- <sup>12</sup> This value represents 2.9% of total receipts.
- <sup>13</sup> This value represents 5% of total economic activity.
- <sup>14</sup> Ratio of 5 year-round jobs/MMBF of sawlogs plus 1 year-round job/3000 tons of biomass. The estimate used for biomass represents approximately 20% of the sawtimber ratio when compared on an equal tonnage basis. No information is available to validate this assumption for biomass.
- <sup>15</sup> Two year-round jobs/MMBF of sawtimber and 0.4 year-round jobs/3000 tons of biomass. See also footnote 14, above.
- <sup>16</sup> Five year-round jobs/MMBF of sawtimber. No jobs associated with biomass.
- <sup>17</sup> \$43,000 of employment related property and labor income per employee assigned to logging and sawmill employment.
- <sup>18</sup> \$38,000 average personal income/logging and sawmill worker, plus \$18,500 average income for Forest Service and local government employment and indirect employment.

## SUMMARY DISCUSSION FOR ALTERNATIVE A

This alternative is the 'No Action' alternative and therefore, if selected, the Whale Rock Project Area will not be affected by the implementation of any project actions. This alternative responds to issues 2, 6, 8, 10, 12 and 13 by preventing direct disturbance from project activities to sensitive plant populations, pristine lava caps and cultural resources; by reducing air quality degradation from dust and smoke from project activities; by eliminating threats to scenic qualities along Highway 50 and the South Fork of the American River; and by eliminating cumulative effects from project-related activities on soils and water.

No Action will avoid direct effects to the watersheds, and there would be no increase in the ERAs within the watersheds as a result of the Whale Rock project. All watersheds except Riverton and Soldier Creek are presently below threshold levels of disturbance. Riverton Watershed, 50% of which burned within the 1992 Cleveland Fire, would return to within threshold levels by the year 2000, and Soldier Creek would recover by 1996. Selection of this alternative would result in little or no funding to support watershed improvements such as road rocking, obliteration of temporary roads or sub-soiling of existing landings and skid roads as planned under all action alternatives in the Whale Rock Project. The indirect effects of No Action would be reflected in increased fire risk within the project area. Catastrophic fire potential would continue to present the greatest risk to watershed health. In fact, severe impacts to these watersheds are predicted because of the potential of catastrophic wildfire.

This alternative would preclude actions that are designed to reduce vegetation density within the project area. Late seral forest conditions would continue to develop, but not as quickly as they would if there were fewer small trees. Timber stands would continue to be characterized by high densities of generally small, shade tolerant species. With continuing high tree densities, timber growth would remain far below potential in plantations and natural stands.

The absence of biomass and small timber removal would require a prescribed burning program that would be minimal in size. High stand density would assure continued high levels of tree mortality from insects and disease. Continued high mortality would add woody debris to the existing high fuel loads. The resultant high fuel loads and high fire risk would maintain an unhealthy, untenable and unstable ecosystem condition. A major, stand-replacing wildland fire would therefore be an eventuality. In fact, more than a third of the total project area has burned within the last 30 years; this trend can only be expected to continue. Such a fire would easily devastate the project area and return substantial acreages to an early seral condition. A stand-replacing fire might also eliminate the genetically unique rust-resistant sugar pine trees, and cause wildlife mortality, as well as causing severe damage to wildlife habitat, including old-growth stands, oak woodlands, riparian areas and the general forest landscape. Viewsheds and watersheds would be severely affected. Air pollution would be maximized from the incineration of thousands of acres and from the subsequent absence of carbon dioxide-



processing green trees. Private property, residences, and other improvements would be threatened.

A wildfire would provide short term benefits to lava cap plant species and some sensitive plant species, although these benefits would be very transitory. Without the introduction of prescribed fire, even those areas that benefit from wildfire would eventually be adversely affected by the influx of competing brush and trees.

There would be no short term return to the counties or to the general public from the sale of forest products. It could be expected that eventually the project area would be logged, but doing nothing increases the probability that future harvest operations would be insect or fire salvage logging. Salvage of forest products would provide a large supply of sawtimber, but this would be of little benefit to local dependent industries in the long term and can not be considered a sound method of managing highly productive timber lands. Community stability benefits, such as reliable employment and economic activity, from the sustained, even flow of forest products into local communities would not be realized. The economic costs of perpetual fire suppression, and ultimately the economic losses associated with foregone timber growth opportunities, are extremely high under this alternative.

Every resource would suffer damage should a catastrophic wildfire occur. Each detailed discussion identifies stand-replacing fire as the largest single risk to the various resources. Reducing the risk of catastrophic wildfire is a prerequisite to returning the Whale Rock area to its historic landscape condition wherein fire enhanced and sculpted the landscape. This alternative is very unlikely to provide ecosystem sustainability, and the desired future condition would not be attained under the scenario presented. In addition, replacement volume for the Cox Canyon Timber Sale would not be secured.

## ALTERNATIVE B: FUELS MANAGEMENT EMPHASIS

This alternative proposes to construct shaded fuelbreaks on major ridges and to treat large, contiguous areas to reduce the risk from catastrophic wildfire. Prescribed burning, commercial thinning and biomass removal are some of the activities proposed under this alternative. A total of 6,303 acres would be subject to fuels treatment, with prescribed burning occurring on 3,633 acres after harvest activities. Another 1,646 non-harvested acres would be broadcast burned, including 590 acres within Spotted Owl Protected Activity Centers (PACs). Machine piling of 1,024 acres would also occur. Approximately 14.5 miles of constructed shaded fuelbreaks are included in this alternative. Harvest activities would include the commercial thinning of 1,124 MBF on 562 acres of plantations and 15,167 MBF on 3,181 acres of natural stands. Total quantities of sawtimber and biomass to be removed are estimated at 22,426 MBF and 67,169 tons, respectively. This alternative is described in detail in Chapter II.

The direct, indirect, and cumulative effects of implementing this alternative are addressed below by resource area in the same order as Alternative A.

### GEOLOGY AND SOILS

**Direct Effects:** The greatest geologic concern in the Whale Rock Analysis Area occurs within the steep canyons of the major streams. These include the canyon side slopes of Silver Creek, the South Fork of the American River and the lowermost portions of some of the tributaries to Silver Creek such as Round Tent Canyon and Jay Bird Canyon. These sensitive inner gorge canyons are susceptible to landsliding and excessive erosion. However, because most of the harvest, prescribed burning and roadbuilding are proposed to occur on relatively flat, stable areas, it is not anticipated that any adverse geological effects will be brought about by the implementation of this alternative.

The adverse direct effects to the soil resource in this alternative are projected to be very small. Potential adverse impacts to the soil resource from thinning operations include loss of soil porosity from equipment compaction, soil displacement from log skidding, and loss of ground cover from equipment operation and skidding. By following LRMP standards and guidelines and Region 5 Soil Quality Standards, and by implementing Best Management Practices (BMPs), these impacts will be minimized.

Implementing a CASPO prescription for retention of down cull logs exceeds the requirements for the Region 5 Soil Quality Standards. The retention of large trees would provide potential future snags, which would provide future large logs, therefore the potential for meeting the large woody material requirements in the future is assured. The proposed subsoiling of skid trails and landings after use and spreading of ground cover over bare surfaces (including grass-seeding and/or mulching) will effectively mitigate these effects. Following standard restrictions for wet-weather periods will also reduce potential harmful effects.

Tractor piling of slash can also produce compacted areas and displace soil. This can contribute to increased erosion and loss of soil productivity. Avoiding operating during wet periods, and scattering slash over bare areas, will reduce and mitigate these indirect impacts. Alternative methods of piling will be considered in locations where there is high potential for loss of soil productivity and threats of high erosion rates through soil displacement and compaction. For instance, the use of equipment with grappler attachments will be considered where stand density conditions permit operation. This equipment can better control the amount of ground cover left behind, and can pile material by lifting with a grapple arm rather than pushing with a blade, which may cause soil displacement. Biomass operations have the potential to cause some soil displacement and compaction, but the equipment and method used generally create less of an impact on the soil resource than traditional tractor harvest. Forest geologists or soil scientists will monitor on-going project activities to determine the need for specific site-preparation measures.

Both beneficial and adverse effects to soils associated with fuels treatment would occur under this alternative. Some of the direct effects of tractor piling would be topsoil displacement and increased compaction. Understory burning, when conducted in prescription, will have little or no direct impact to the soil resource. However, it is difficult not to create some 'hot spots' which will reduce ground cover below acceptable standards. Also, organic material may be consumed, water repellent soils could be created, and large woody debris essential for long term productivity could be consumed. It is impossible to predict where these areas might be located prior to burning, since they are dependent upon a number of factors, such as relative humidity, wind direction and wind speed. Mitigations for these 'hot spots' would include seeding and/or mulching to provide ground cover, if needle cast or resprouting vegetation (such as bear clover) is insufficient.

With the exception of permanent soil displacement, non-mitigated compaction and loss of some essential components for nutrient cycling (such as organic matter, woody debris and down logs), these direct effects are short term, and the soil resource will recover relatively quickly. Long term direct effects could be permanent, for example, road construction, which causes loss of on-site soil productivity and takes the land out of production (1.7 miles of new road are planned in this alternative). Other long term effects include those resulting from skid trail and landing construction (loss of soil porosity, compaction, soil displacement, and loss of ground cover). The planned watershed improvement needs (WIN) projects described in Appendix G for improving road drainage, stabilizing stream crossings, rocking roads, obliterating portions of system roads and abandoned skid trails, and obliterating landings should protect the soil resource and return more of the soil back into productivity than the amount lost through new road construction. Where possible, existing skid trails and landings will be reused to minimize disturbance.

**Indirect Effects:** There are no anticipated adverse, indirect effects to the geological resources in Whale Rock. Additionally, by reducing the risk of a catastrophic wildfire, slope stability is indirectly benefited, as large fires can adversely alter the stability of a given landscape. The inner gorge areas and previously mapped landslides would be at highest risk to reactivate and deliver sediment directly to the stream system. By reducing the wildfire risk, the risk of future landslides is also reduced.



Indirect effects to soils are anticipated. Compaction and loss of vegetative cover indirectly lead to increased soil erosion by raising the water table and increasing the amount of surface flow. Skid trails, roads and ruts left by equipment can concentrate these surface water flows and thereby increase flow velocity. The use of water bars to slow surface flow will help mitigate this adverse effect. Compaction also reduces soil productivity by collapsing soil structure, which reduces the ability of roots to penetrate the soil. Overall, because soil standards would be met in this alternative, there would be no measurable loss in soil productivity from harvest activities and post-project site preparation activities, except in permanently established roads, landings, or other compacted surfaces.

Understory burn areas will generally produce no adverse effects because the burns are usually kept at low intensities. However, where slash is concentrated there may be "hot spots" where soil burn intensities become moderate or high. In these instances, total ground cover may be eliminated and organic matter and large woody debris may be consumed. The indirect effects of such action would be increased soil erosion and loss of both short and long term soil productivity. However, these areas will be small and isolated and the overall effect will be minimal.

Another indirect effect of implementing this alternative will be to greatly reduce the risk of catastrophic wildfire. If a large, high intensity, stand-replacing wildfire were to occur in the untreated condition, it would cause the greatest adverse effects to the soil resource. These include loss of soil cover, increased erosion rates and loss of long term soil productivity. The fire could produce significant long term effects due to the reduction of available nutrients caused by increased levels of soil loss.

**Cumulative Effects:** A forest-wide monitoring study has indicated that soil mitigation measures have been effective in meeting soil cover and porosity objectives. With the retention of large down woody material, it is expected that standards for organic matter would also be met. Therefore, there should be very little net increase in soil loss or decrease in soil productivity resulting from implementation of this alternative or any foreseeable future activities in the Whale Rock area, since BMPs and erosion control measures will be applied to project activities. Positive effects to geology and soils brought about by reducing the risk of catastrophic wildfire should outweigh any negative cumulative effects in Alternative B.

## HYDROLOGY

The assumptions used to analyze effects are included in Appendix G.

**Direct Effects:** Direct effects found on-site generally do not indicate the condition of the entire watershed, since these effects are often short term and are mitigated through the implementation of protection measures such as BMPs. The application of appropriate BMPs (Appendix A) are expected to reduce nonpoint sources of pollution from sediments to levels compatible with water quality goals.

Direct effects to water quality can be expected as a result of timber harvest in units containing streamcourses or in areas where road construction or reconstruction involves stream crossings. Some level of accelerated erosion is an almost certain by-product of logging due to direct effects to soil resources including soil displacement, compaction, or a change in ground cover. When these activities occur near streamcourses, the potential to impact beneficial water uses increases, particularly from nonpoint source pollution.

Eleven Class III streamcourses are within harvest areas in Soldier Creek Watershed, five in Pacific House Watershed, three in Jaybird, and two in Sunset. Beneficial uses of water will be adequately protected by LRMP requirements for each of these Class III streams (a 100-foot equipment exclusion zone). Since these specific areas have low drainage densities and the harvest areas containing the streams are located high on slopes away from most beneficial uses, any sedimentation that may occur in these areas will likely be filtered out before reaching the main stream stem.

The situation is slightly different for the Riverton Watershed, where harvest areas contain fourteen Class III streamcourses. While the locations of most harvest activities in Whale Rock are on ridgetops away from active streamcourses, activities proposed in the Riverton Watershed are adjacent to the north side of the South Fork American River, where they extend nearly to the canyon ridgetop, encompassing many small streamcourses. A very high potential for direct impacts to water quality exists within one particular area that has a considerably high drainage density (T11N R13E, Section 25). Expanded streamcourse protection for all Class III streams in this area includes a 50-foot no harvest zone; a 100-foot equipment exclusion zone; and cutbanks not to exceed 24 inches near skid trail stream crossings. Areas where problems may already exist will be recontoured, seeded and mulched.

In the Round Tent Watershed, six Class III streamcourses are within harvest areas. These harvest areas are also located high on slopes; however, the channels in the headwaters (T11N R13E, Section 12) are extremely dynamic systems. Streamcourses in this area commonly change course along the small floodplain while transporting relatively high sediment loads. Disturbance in or adjacent to these small channels has a high potential to affect the entire stream system. Expanded streamcourse protection for all Class III streams in this sensitive area of Round Tent includes a 50-foot no harvest zone; a 100-foot equipment exclusion zone; and the avoidance of skid trail stream crossings whenever possible.

Exceptions to the above mitigations for the Riverton and Round Tent Watersheds can be made based on field analysis by hydrologists to determine more appropriate actions. For example, if an area is overstocked with timber, the 50-foot no harvest zone may be dropped if a hydrologist verifies that harvest could benefit the streamside management zone. Given these requirements, there will be a very low potential for direct impacts to water quality in either watershed.



Harvest areas in Jaybird Watershed are primarily located high on slopes. However, harvest areas in a portion of Jaybird (T11N R13E, Section 2) extend down to roughly the lower quarter of the hillslope above the main stream stem. This area also includes two Class III streams. On the easternmost drainage there is a skid trail that parallels the stream channel. This particular area has concerns from a ground cover and fuels perspective, since the channels in this section appear to have a considerable load of fine fuels adjacent to the streams. The fuels in this area are presently providing an excellent buffer to the stream channel by filtering sediments coming from the skid trail. Reductions or removal of ground cover in this filter zone will likely lead to stream sedimentation in these relatively steep tributary drainages. Ground cover following prescribed burning will be maintained to at least 70% near the streamcourses in this sensitive area. If ground cover removal exceeds the prescription, this area will be mulched following the prescribed burn to provide at least 70% ground cover. Alternately, protection could be provided by hand piling and burning slash near the streamcourses in this area to limit the reductions in ground cover resulting from burning. Given these requirements, there will be a very low potential for direct impacts to water quality.

Reduction in ground cover would primarily be associated with new road construction, skid road construction and reconstruction, and post-sale prescribed burning and machine piling (refer to the Soils section for a description of the effects caused by reducing ground cover). Direct watershed effects of prescribed burning would be a loss of ground cover. When this reduction in ground cover is in or adjacent to a streamcourse there is a greater potential for sediments to be deposited into streams. It is also common for many of these streams to have relatively high fuel loads. These sensitive areas often require special treatment to provide protection from wildfire. Burning prescriptions within streamside management zones will have an objective of maintaining 70% ground cover. If an area burns excessively hot and reduces ground cover below 70% in streamside zones, the area will be straw-mulched following the prescribed burn.

This alternative involves the reuse of many existing skid roads and landings, with skid roads occupying approximately 10% of the surface area in harvest units. This amount is considered to be of little consequence in terms of undesirable effects to water infiltration rates (Anderson 1976). Proposed new road construction consists of 1.7 miles spread over four watersheds (Appendix G). The hydrologic effect of these roads is expected to be quite minor since the roads will be primarily located on ridgetops and upland slopes. No Class I or II streams would be affected.

The primary direct effect from road work occurs at stream crossings. Direct effects from road construction are expected to be minimal in Lower Silver and Jaybird Canyon since there are no new stream crossings. Within Round Tent Watershed there will be one new stream crossing, but this is located in the uppermost section of a small tributary away from most beneficial uses of water. Application of Standard BMPs 2.1 through 2.27 are expected to mitigate direct impacts to the channel system. It is unlikely that the stream system would be affected, since there is a large area capable of filtering out any sediment before it reaches in-stream beneficial uses. Within Pacific House Watershed there are two new Class III stream crossings proposed, both within 1/4 mile of each other on the same



tributary (T11N R13 E, Section 22). This would pose a *moderate* risk for impacting the stream channel. It is unlikely that beneficial uses of water would be affected, given the implementation of standard BMPs 2.1 through 2.27. Cut and fill slopes associated with these Pacific House Watershed stream crossings will be treated by either dry-seeding and mulching or hydro-seeding to mitigate potential impacts.

Road reconstruction will improve control of road surface runoff, thus correcting some of the current sedimentation problems associated with the existing road system. Areas of new road construction would be particularly sensitive until the cut and fill slopes revegetate. Standard practice would be to dry-seed or hydro-seed the more sensitive areas. All main skid roads will be subsoiled after use, providing further beneficial effects to infiltration rates, since many of these are currently compacted.

Watershed restoration work addresses existing erosion and sedimentation impacts within the watersheds affected by the Whale Rock project. More detailed descriptions of projects in Riverton and Soldier Creek Watersheds can be found in the rehabilitation plans located at the Eldorado National Forest Supervisor's Office (Boyd 1995; Farley 1995). These plans have been developed to improve watershed conditions within these two watersheds that are presently considered over threshold. Many projects identified in Riverton Rehabilitation Plan are outside of the Whale Rock project area. The majority of these projects are road-related and are addressed in road reconstruction miles. Other small projects address stabilizing sites of active erosion or stream sedimentation. In other watersheds, watershed improvement needs (WINs) have been identified to stabilize erosion or sedimentation or to decrease impervious surfaces and thereby reclaim soil productivity and improve hydrologic function in compacted areas adjacent to streams.

**Indirect Effects:** Indirect effects are generally longer lived than direct effects and are commonly a result of direct effects. Indirect effects are likely to be present in a section of a stream course, tributary, sub-watershed, or in worst cases, on a watershed scale. A broader scale of indirect effects could be an indicator of potential adverse cumulative watershed effects. Indirect watershed effects include any impact to water quality through nonpoint source pollution, changes in runoff rates, or changes in channel morphology. Sediment transport, a product of erosion, occurs due to a loss of ground cover, soil displacement, and/or compaction as described previously in the Soils section. Changes in runoff rates are attributable to soil compaction and changes in evapotranspiration rates occurring when vegetation is removed. Channel morphology alters as a result of changes in flow regimes and/or sediment routing functions. When large contiguous areas are harvested the potential for impacts to channels is greater. Skid trails and road systems can become extensions of the drainage network. When these features extend from channel bottom to ridgetop, the potential for impacts to drainages also increases. Subsoiling of main skid trails will provide beneficial effects by decreasing the potential to contribute to surface and peak flows that could otherwise affect channel morphology.

Removing vegetation through harvesting is normally expected to increase streamflow. Harvest prescriptions call for the removal of approximately 30% of the existing basal

area, which is relatively light in terms of volume removed or changes in canopy cover. Averages from 94 separate experimental studies show that a 10% reduction in forest pine cover equates to a 1.5 inch change in water yield (Bosch and Hewlett 1982). Applying this average to the Whale Rock area, an increase of approximately 4.7 inches in water yield stage could be expected. However, according to other studies, streamflow regime changes are normally not detectable when 20% or less of the forest cover is removed (Rothacher 1970; McMinn and Hewlett 1975). These latter studies appear to more closely resemble projected disturbances and conditions present in the Whale Rock project area than the averages from the larger study group. The thinning prescriptions will retain vegetative characteristics (an edge effect from expanding roots and canopies of residual trees) that will provide adequate buffers to prevent substantial increases in peak flows and a pattern that would provide for more rapid site recovery (Rothacher 1970; Satterlund and Adams 1992). Thus, it would be expected that harvesting under this alternative would cause a slight increase in peak flows as well as extending the flow into late summer when water supply is most needed. Since thinnings have only transient influences on water yield because of expanding roots and canopies of residual trees, durations of increased streamflows are expected to be limited (Anderson 1976). Post-sale prescribed burning would also tend to increase the late summer streamflow patterns to a small degree.

The reduction in existing vegetation due to harvesting will result in a higher level of soil moisture available to vegetation. This increased soil moisture would be utilized as root systems expand to take advantage of decreased competition. Higher levels of water availability would reduce the rate of occurrence of drought-related mortality. Moisture levels associated with streams, springs and seeps would increase and be available longer into the year. Observations by Pacific District foresters indicate that previously thinned areas within the Whale Rock project area resulted in a reduction in competition, increased levels of soil moisture, and substantial reductions in tree mortality within harvested stands.

The proposed activities in this alternative are sufficiently large as to reduce the likelihood that a high intensity wildfire would destroy the harvest areas or adjacent stands. If this area is protected from a catastrophic fire, long term watershed condition would be considerably better. The increased risks of indirect effects to the watershed caused by actions in this alternative are expected to be offset by the reduced future risk of catastrophic fire impacts.

**Cumulative Effects:** A cumulative watershed effects (CWE) analysis for this alternative was completed in accordance with R5 methodology as refined by the Eldorado National Forest (Carlson and Christiansen 1993); the analysis report and Whale Rock Project Supplements are part of the planning record and can be reviewed at the Eldorado National Forest Supervisor's Office. Timing of proposed activities would vary by watershed and alternative. By dispersing projects over time and space, the potential for cumulative watershed effects will be decreased by preventing large amounts of disturbance to the system all at once. A slight increase in disturbance and a slight recovery period will probably occur before full completion of each proposed activity.



Harvesting and post-sale activities would occur over a seven year period (1996-2003). Assumptions used in this analysis generally assume a worst case scenario, thus the effects would be *less* than depicted in this model (refer to Appendix G for explanation of modeling assumptions). The results of this analysis are displayed in the following table:

<b>Table 27. Alternative B Cumulative Watershed Effects</b>								
Watershed	Established TOC(%)	%ERA - Present/Projected						
		1995 (present)	1998	1999	2000	2001	2002	2003
Pacific House	10-12	5.1	4.9	5.0	5.5	5.6	5.5	5.4
Soldier Creek	12-14	12.4	11.3	13.1	13.9	14.2	14.4	14.1
Riverton	10-12	12.9	10.4	10.3	9.8	9.6	9.3	8.9
Lower Silver	10-12	7.0	6.6	6.9	6.9	6.9	6.7	6.7
Round Tent	12-14	7.3	7.6	12.8	13.0	13.1	14.2	13.4
Sunset	10-12	8.7	8.8	8.6	8.8	8.1	7.9	7.4
Jaybird	14-16	8.2	7.9	11.9	15.7	18.1	15.2	14.7

A review of the above table indicates that Soldier Creek and Riverton Watersheds are currently at or above the established threshold of concern (TOC). As a result of Alternative B, Round Tent Canyon and Jaybird Canyon Watersheds would also exceed the estimated TOC. A level of disturbance that exceeds the threshold of concern is considered to put the watershed at an extreme risk for adverse CWE. However, to reiterate a very important point, proposed harvest, road construction, site preparation, fuel breaks and fuels treatments have a low potential for producing direct and indirect watershed effects that could contribute to the potential for adverse cumulative effects, as described in the direct and indirect effects sections above.

A catastrophic, stand-replacing wildfire similar to the adjacent Cleveland Fire, burning acreage similar to amounts being treated under this alternative, would cause watershed effects in the overall project area that are considerably more severe and of longer duration than the effects portrayed by management activities under this alternative. For example, under catastrophic fire conditions, the projected ERAs nearly double those displayed above, with Soldier Creek having the highest predicted ERA of 25.4% (Table 24).

The CWE Reports and the CWE Supplements for each watershed are available in the planning record for the Whale Rock project for additional discussion on risks associated with predicted ERAs. Appendix G contains a disclosure of proposed activities by watershed and the effects those activities will have on the watersheds by alternative, as well as more thorough discussions of the existing conditions. The following further summarizes the CWEs by watershed:

Riverton Watershed: Implementing this alternative results in harvest of about 5% (581 acres) and prescribed burning of about 7% (804 acres) of the total watershed acreage. Approximately 37% (213 acres) of the proposed harvest



would be within existing plantations. The current high ERA calculated for the Riverton Watershed is primarily a reflection of the aftereffects of the Cleveland Fire which burned 50% of the watershed. Implementation of this alternative would not increase the predicted %ERA above the current percentage and the watershed would recover to a level of disturbance below threshold by the year 2000. This would be slightly longer than the No Action Alternative A that recovers to below threshold disturbance levels by 1999. It should be noted, however, that while this recovery reduces the risk of adverse CWE from an extreme level, the watershed will still remain at a disturbance level considered high risk until roughly 2005. This is also the case for the No Action Alternative A. At all times the disturbance level for this watershed remains lower than the 15.7% ERA calculated following the Cleveland Fire. It also results in a %ERA lower than that which would exist if the Whale Rock project area were to burn in another catastrophic wildfire.

With the implementation of the Riverton Watershed Restoration Plan (Boyd 1995), there will be a reduction in the existing sources of erosion and sedimentation. Most of the proposed restoration activities are within the portion of the watershed burned in the Cleveland Wildfire, outside the Whale Rock project area. The Whale Rock Project does, however, incorporate repair on a small number of road-related erosion projects through road reconstruction. This will result in the decrease of erosion and sedimentation levels that presently exist within portions of the project area.

Implementation of Alternative B, along with selected BMPs, special mitigation measures, and other Forest Standards and Guidelines, will insure that downstream beneficial uses of water will be adequately protected. Alternative B will not increase the risk for continued adverse CWE within the Riverton Watershed, and the watershed will continue to recover to disturbance levels lower than those that presently exist.

Soldier Creek Watershed: This alternative proposes very high levels of activity that increase the risk of adverse CWE higher than the levels proposed in every other alternative. Implementing this alternative results in harvest of about 25% (857 acres) and prescribed burning of about 27% (944 acres) of the total watershed acreage. Approximately 6% (55 acres) of the proposed harvest would be within existing plantations and roughly 24% (208 acres) would be associated with fuelbreak construction. The existing extreme risk of CWE for this watershed is a reflection of past land management activities that have occurred on both public and private lands. This watershed would actually recover to a disturbance level below threshold during 1998. However, with implementation of this alternative, the watershed would again climb to disturbance levels considered over threshold. The watershed would return to an ERA rating less than the TOC between 10 and 15 years after implementation.

Given the implementation of the Soldier Creek Watershed Restoration Plan (Farley 1995), there will be a reduction in the existing sources of erosion and sedimentation. The Whale Rock Project incorporates repair on many road-related erosion projects identified in the plan through road reconstruction. In addition, soil productivity will be improved by temporary road, skid trail and landing obliteration. Erosion will be decreased by stabilizing other small areas as identified in the rehabilitation plan. Other road obliteration and stream stabilization restoration work scheduled on the Black Flag Salvage Sale will improve watershed conditions by reducing channel erosion rates. This will result in the decrease of erosion and sedimentation levels that presently exist within portions of the project area.

Adequate protection for downstream beneficial uses will be provided through implementation of this alternative, along with selected BMPs, special mitigation measures, and other Forest Standards and Guidelines. Beneficial uses which could potentially be affected include fisheries and the aquatic ecosystems present within the perennial sections of Soldier Creek Watershed, as well as those located downstream in the South Fork American River. The level of disturbance proposed in Alternative B, in addition to the already high disturbance levels, will likely contribute to the potential for continued adverse CWE within the Soldier Creek Watershed for the next 10 to 15 years. This watershed will continue to be at an extreme risk level until roughly 2010, when the watershed would recover to below threshold levels of disturbance. Note that in the event of a wildfire, the magnitude of disturbance would be greater and recovery slower (remaining over threshold for 15-20 years).

Round Tent Watershed: The level of disturbance proposed in Alternative B is a substantial increase for this watershed. Implementing this alternative results in harvest of about 47% (1157 acres) and prescribed burning of about 55% (1348 acres) of the total watershed acreage. Approximately 1% (15 acres) of the proposed harvest would be within existing plantations, while roughly 25% (285 acres) is associated with fuelbreak construction. The %ERA resulting from the proposed activities almost doubles existing levels. The watershed would be considered over threshold levels of disturbance for six years (1999-2004). The watershed will recover to a disturbance level below threshold by the year 2005.

Implementation of this alternative, along with selected BMPs, special mitigation measures, and other Forest Standards and Guidelines, will provide adequate protection for beneficial uses downstream, although the beneficial uses likely to be affected within this watershed are limited. In a past survey (Rowe 1979), fish were present in the watershed. However, no fish were observed in this watershed in a survey conducted July 1995 (Christiansen 1995), probably due to the combined effects of seven years of drought followed by high flushing flows from the 1995 water year. Aquatic invertebrates and newts are still common in the perennial sections of this stream channel.



Given the implementation of the WIN projects, there will be a reduction in the existing sources of erosion and sedimentation, especially as road-related erosion problems will be repaired through road reconstruction. In addition, soil productivity will be improved and erosion potential reduced in areas where system roads, temporary roads, skid trails and landings will be obliterated.

While the disturbance level that would be associated with this project is lower than that expected with a catastrophic wildfire, this watershed would actually be expected to recover to below threshold levels of disturbance more rapidly from a wildfire (roughly 5 years).

Jaybird Watershed: This alternative proposes levels of activity that increase the risk of adverse CWE higher than the levels proposed in every other alternative. The %ERA resulting from the proposed activities more than doubles existing disturbance levels. Alternative B results in harvest of about 55% (916 acres) and prescribed burning of about 49% (806 acres) of the total watershed acreage. Approximately 4% (38 acres) of the proposed harvest would be within existing plantations and 24% (216 acres) would be associated with fuelbreak construction. The watershed would be considered over threshold levels of disturbance for at least six years (1999-2004); it would return to an ERA rating less than the TOC by roughly the year 2005.

Under this alternative, many of the road-related erosion problems would be repaired through road reconstruction. In addition, soil productivity will be improved in the areas of temporary road, skid trail and landing obliteration. Given the implementation of the WIN projects, there will be a reduction in the existing sources of erosion and sedimentation. Implementation of this alternative, along with selected BMPs, special mitigation measures, and other Forest Standards and Guidelines, will provide adequate protection for beneficial uses downstream. Beneficial uses which could potentially be affected by activities in Jaybird Canyon include aquatic ecosystem species within the perennial sections of channels (mayflies, stoneflies and caddisflies have all been observed within the watershed). There are no fish within Jaybird Watershed, likely due to the steep barriers located at the confluence of Jaybird and Silver Creeks. Any potential effects are likely to be very limited, however, since uses are limited and there is a downstream reservoir. In addition, aquatic invertebrates generally recover quite rapidly. Jaybird Watershed drains into Silver Creek at the Camino Divide Reservoir below the Jaybird Powerhouse. An influx of sediment could affect the water holding capacity of the reservoir.

Predicted disturbance levels from a fire are highest overall, and in 1999 would be nearly double those associated with project activities in Alternative B. While the disturbance level that would be associated with this project is generally lower than that expected with a catastrophic wildfire, the cumulative effects model shows recovery to below threshold levels of disturbance more rapidly from a



wildfire (roughly four years sooner). The model probably overstates the case as it would happen on the ground, as catastrophic fire would likely result in far greater adverse effects to the watershed resource than the proposed activity (refer to Appendix G for a discussion of the model limitations).

Lower Silver, Sunset and Pacific House Watersheds: These three watersheds display a similar pattern in terms of cumulative effects. All three watersheds remain below the TOC after implementation. Proposed activities will affect less than 10% of each watershed's total acreage.

Sunset Watershed has a maximum projected ERA of 88% of the TOC. This disturbance level would exist before implementation of the Whale Rock project as a result of Timber Harvest Plans that were harvested in 1995. This level would recover to a moderate risk level (less than 80% of TOC) by the year 2002. Disturbance levels in terms of ERAs would continue to recover to below existing levels even with the implementation of Alternative B.

Pacific House and Lower Silver Watersheds will both be considered at a moderate risk for adverse CWE following implementation of Alternative B. While the disturbance in Lower Silver would continue to recover below existing levels (in terms of ERAs), Pacific House would increase slightly until about 2005 when %ERA would return to existing 1995 land disturbance levels. A substantial influx of sediment coming from Round Tent Watershed into the flow-controlled river downstream of Camino Divide Reservoir in Lower Silver Creek could affect channel morphology and the associated beneficial uses of water in Lower Silver Creek.

Lower South Fork American River Basin: Implementation of Alternative B would result in a 2% increase of the basin area that is considered at extreme risk for adverse CWE and a 1% increase in the basin area considered at a high risk for adverse CWE. This shift would also result in a 2% reduction of the total basin area for watersheds presently considered to be at a moderate risk of adverse CWE.

## **VEGETATION, BIODIVERSITY AND TIMBER**

Short term effects are here assumed to be those present at the end of 5 years and long term effects those present at the end of 50 years. Following a general overview, the effects are described under the following subheadings: vegetation strata (size class and density); species composition; tree/stand age; stand density; late seral forests – occurrence, fragmentation, and connectivity; lava caps; rust resistant sugar pine; oak woodlands; and riparian areas.

## General Overview

**Direct Effects:** The effects of implementing this alternative are different for the existing plantations than for the natural stands. Because all harvest prescriptions would either be a light CASPO prescription or a somewhat heavier fuelbreak CASPO prescription, it is not expected that any openings would be created sufficiently large as to require planting, i.e., no openings larger than 1/4 acre are expected.

### Plantations

Short term effects will occur from the selective thinning of 562 acres of 35-year-old plantations within the project area. The thinning would result in a harvest of approximately 2.0 MBF per acre of sawtimber (1,124 MBF for the project area) and 5 tons per acre of biomass (2,810 total tons for the project area).

Approximately 40% of the existing trees (representing about 30% of the stand basal area) would be removed. The plantation strata type would change from a P2G to a P3N. This change in size class designation occurs because the average tree diameter of the leave trees would be approximately 14 to 16 inches immediately after thinning, compared to the pre-thinning average diameter of approximately 10 to 12 inches; this is a direct result of harvesting smaller trees and not a growth response.

Long term effects of this alternative include a substantial increase in diameter growth of the residual trees, beginning about 5 years after thinning. The diameter growth would continue to increase until annual diameter growth rates would be two or three times larger than the rates would have been without thinning. Ten years after harvest, diameter growth would attain a rate of 1/2 inch per year. Growth will continue at this rate only if follow-up thinning occurs at 10 year intervals to control inter-tree competition. With regular thinnings, 50 years after current entry, the plantations would average approximately 50 trees per acre, and individual trees would average about 26 inches in diameter, with the largest trees in excess of 46 inches.

This alternative calls for understory burning to maintain low fuel loadings. Fire intensity would be controlled to avoid individual tree scarring or mortality. Most of the ground fuels would be light and would be nearly consumed by the prescribed fires.

### Natural Stands

Short term effects of selectively thinning 4,095 acres of natural stands within the project area would result in a harvest of approximately 5.2 MBF per acre of sawtimber (21,302 MBF for the project area) and approximately 16.0 tons per acre of biomass (64,360 total tons for the project area). Approximately 6,000 MBF of the above volume would be derived from the harvesting of 914 acres of proposed shaded fuelbreak.

For most of the proposed units, approximately 50-75% of existing stems would be removed by harvesting. However, since the typical tree selected for removal would be

smaller than the stand average, the actual basal area reduction would not be directly proportional. The estimated reduction in basal area is expected to be about 30 percent. Strata size designation would increase as a result of harvest. This change in size class designation occurs because the average tree diameter of the leave trees would be larger than the average tree size of the existing stand. This is a direct result of harvesting smaller trees and not a growth response.

Changes in the percentage of canopy closure would vary among the units. Since most of the trees that would be removed are in the understory, the overall reduction in canopy closure would not be proportionate to the reduction in the number of trees or the basal area. For some stands, canopy closure would be virtually unchanged, while for others, particularly those within the designated shaded fuelbreaks, the reduction may approach 50 percent.

Natural stands located within proposed shaded fuelbreaks would generally be thinned to closely approximate the maximum allowed by CASPO in order to achieve a functional fuelbreak. As a result, the stands within the fuelbreak would appear more open, with tree crowns generally not touching. The remaining trees would generally be the best of the dominant and co-dominant trees. Growth rates on these trees are expected to be about 350 board feet per acre per year.

Long term effects of decreased tree density would cause a corresponding decrease in inter-tree competition. Reduced competition would permit individual trees greater access to sunlight, water and nutrients. The result would be displayed by increased rates of diameter growth. Since residual trees would primarily be selected from the dominant and co-dominant crown classes, observable growth responses would occur 5 to 10 years after thinning. The rate of height growth would not change substantially; however, because of a reduction in natural pruning, the live crown ratio and overall crown dimension would increase.

Since the individual trees would have improved growing conditions, the overall resistance of the timber stand to environmental stress, including insect attack, drought or disease would improve. As a result, mortality levels would decrease and net growth and gross growth of the timber stand would become more nearly the same.

Proposed prescribed burning would greatly reduce the amount of woody debris and duff on the forest floor. The smaller trees that are below the 4-inch minimum harvest size would be killed by the first fires, when fuels are heavy and consumed rapidly in the burning. With a reduction in the depth of the duff layer and the increased openness of the stands in general, natural regeneration would occur. The more shade tolerant species would remain the primary seed sources, although the seed bed would improve the conditions suitable for the more sunlight demanding species. Where ground fuels are very light after burning, the newly established or natural regeneration may survive the follow-up prescribed burns.



The result of the above changes would be timber stands that are much more open and free of brush and dense, competing young growth conifers. Compared to the current situation, the percentage of ponderosa pine and sugar pine would be greater. The stands would be less dominated by the shade tolerant species of white fir and incense cedar. Growth would be concentrated on fewer trees.

The more open stands would reduce the likelihood of a stand-replacing wildfire, thus the continued development of the stands into the future becomes more assured. Continued development translates into a greater opportunity to achieve stands that contain a greater percentage of larger trees.

**Indirect Effects:** Indirect effects upon the natural stands and plantations are essentially the same, therefore they are discussed together in the following section.

#### Plantations and Natural Stands

The low stocking levels in the natural stands would result in growth within the proposed fuel breaks less than that realized under typical, timber defined, full-stocking conditions. This growth reduction is difficult to predict because of the variable site conditions and growth rates, but is expected to be about 25 percent. In the long term, as the heavy fuel loads are reduced, it is expected that a shaded fuelbreak system would not be needed and somewhat higher stocking levels within the fuelbreaks would be permitted. By reducing the stocking and the amounts of understory vegetation, seed bed conditions for light demanding species, including conifers, would be improved. In order to maintain fuelbreak effectiveness, control of this ground vegetation would be necessary. It is expected that a combination of discing and prescribed burning would be used to control the establishment of unwanted vegetation.

The implementation of this alternative would substantially reduce the likelihood of tree mortality caused by insect epidemics or stand replacement wildfires within the project area. The effects of this reduced risk would be significant in terms of timber management implications. Some of these effects would include the following:

The substantial reduction in the likelihood of an insect epidemic and/or wildfire would provide better assurance that the existing stands could be carried through to maturity. The long term sustained yields that are planned from these stands would then be attained.

By reducing the risk of a major fire, the lost investments associated with the destruction of high-cost plantations would be curtailed.

The project area would be managed in more of a mosaic, without large blocks of contiguous, even-aged stands dominating the landscape. The smaller sized units, whose site conditions would be tempered by adjacent stands, would allow for more species variation, thus providing additional stand resilience against insect or disease problems.

A more constant flow of forest products would be assured, thus facilitating long term timber management. The current situation, where tremendous salvage volumes are irregularly generated by salvage associated with wildfires or insect epidemics, would be replaced with a more even flow of products from live trees.

Volume losses as a result of severe damage to some trees by wildfire would be reduced. It is recognized that during the initial stages of implementation of this alternative, it is possible that there could be loss of control of some of the prescribed burns. If a prescribed fire escapes control, some of the same risks to the timber resource would be experienced as in a wildfire situation.

**Cumulative Effects:** Only those effects listed above could be expected to continue. The remaining foreseeable projects will have no cumulative effects to plantations and natural stands.

### **Vegetation Strata (Size Class and Density)**

**Direct Effects:** Short term effects will include an increase in the average diameter of the residual trees (this short term increase results from removal of smaller trees rather than from growth). The degree of increase varies from stand to stand depending on the existing distribution of tree diameters and the intensity of proposed harvest. In stands that consist of large numbers of trees that are uniform in diameter, the increase in average diameter of the stand would be small. In stands with a wide distribution of diameter classes, the increase in residual tree diameter would be as large as 10 inches. A sampling of plot data indicates that for the natural stands within the project area, harvesting would result in an average diameter increase of nearly 4 inches, with diameter increase extremes of 0 to 26 inches occurring. In terms of size class changes only, 60% of the 3N,G strata proposed for harvest would be designated a 4 size class after harvest. Since approximately 70% of the 4,657 acres proposed for harvest is in 3 size class strata, this change of size class 3 to size class 4 would occur on 1,956 harvested acres.

Though estimates of percent crown closure after harvest are difficult to determine, it is estimated that canopy closure for most 3N,G stands will decrease one class. In the fuelbreaks, the post-harvest canopy closure is expected to be about 35% or a "P" class. All 4N,G stands will retain at least 40% crown closure, thus they will all be maintained as a 4N or possibly 4G stand.

**Indirect Effects:** There will be a substantial increase in size class 4 strata through the growth of leave trees. Using the timber growth model *Prognosis*, and assuming an even age distribution within the size class 3 strata, all of the 3N and 3G strata would grow into the size class 4 within 30 years (Fites 1994). As described above, with harvest, 60% of the 3 size class stands will become 4 size class stands upon harvest. The remaining 40% of the stands are expected to become size class 4 in 20 years or less. Canopy closure would take at least 30 years to change one class.

It is therefore estimated that with harvests, but no wildfires, the amount of 4N,G strata will increase from 1,995 acres (13.8% of project area) to 9,450 acres (67% of project area) within 50 years. All of the size class 2 strata will become at least size class 3 strata, and some of the size class 2 strata will become size class 4 strata. All of the existing young plantations will become size class 3 strata. It is expected that the only locations where size class 2 strata will occur are on those lands where conifers do not dominate, such as lands dominated by black or canyon oak, and brushfields through which conifers are emerging.

**Cumulative Effects:** None of the other foreseeable future projects should have any cumulative effects to vegetation strata; only those effects noted above are expected.

### Species Composition

**Direct Effects:** Short term effects on the species composition of proposed harvested areas would include changes as indicated in the following table.

<b>Table 28. Changes in Species Composition in Alternative B</b>		
	<b>Basal Area</b>	<b>Basal Area</b>
Species	Pre-harvest %	Post-harvest %
Ponderosa pine	16	18
Sugar pine	2	3
White fir	30	31
Incense cedar	30	22
Douglas fir	12	14
Oak	8	10
Other	2	2
<b>Total</b>	100	100

The post-harvest species composition will not be uniform because of current irregular species distribution across the landscape. The percentage of ponderosa pine on the ridgetops (fuelbreaks) will be higher than indicated above, but less than indicated on the lower slopes. The shade tolerant fir and incense cedar will be more abundant on the lower slopes because these species currently dominate those areas.

**Indirect Effects:** Long term effects will occur to the distribution of species. Shade tolerant species will regularly re-establish in the understory. However, the proposed understory burning will tend to preclude most of the shade tolerant species from becoming successfully established. Ponderosa pine seedlings are more successful in terms of establishment in the presence of fire, thus the understory will have a higher percentage of ponderosa pine than did the pre-harvest stand. The residual white fir overstory will continue to decline in numbers because of insect and drought effect.



However, it is not expected that the white fir will lose its position of dominance within 50 years unless harvested.

**Cumulative Effects:** There will be no additional effects beyond those described above as a result of any other projects in Whale Rock.

### **Tree/Stand Age**

**Direct Effects:** Direct effects will occur because the removal of the smaller and somewhat younger trees will cause a slight increase in average residual tree ages, when compared to the pre-harvest situation. It is expected that this change will be minor, although it has not been measured.

**Indirect:** There are no indirect effects of this alternative upon tree/stand ages.

**Cumulative Effects:** There are no cumulative effects in this alternative upon tree/stand ages.

### **Stand Density**

As stands age, inter-tree competition causes decreases in tree density. The natural rate of decrease is dependent upon the age of the stand. Young stands tend to have greater decreases in tree numbers in a given period of time compared to older stands. Proposed harvest prescriptions will remove many of those trees that would eventually succumb to competition.

**Direct Effects:** Effects will occur as previously described for the Vegetation Strata – Size Class and Density section above.

**Indirect Effects:** Long term effects are expected to occur. Refer to the Vegetation Strata – Size Class and Density section, above, for a description of density changes. Within 50 years, inter-tree competition will have returned and some mortality can be expected. The amount of mortality will be somewhat dependent upon weather and the presence of any additional harvest during the intervening years.

**Cumulative Effects:** No measurable cumulative effects are anticipated upon overall stand density within the project area from any foreseeable future projects.

### **Late Seral Forests**

**Direct Effects:** Short term effects have been partially described above. An estimated 261 acres of 4N,G stands will be harvested under this alternative. The retention of at least 40% crown closure will assure that these stands retain their late seral attributes of size and crown closure.

**Indirect Effects:** Long term effects will occur. Prescriptions are intended to perpetuate the large tree element characteristic of late seral forests. Other elements commonly associated with late seral forests, such as high number of snags and down logs, will not characterize the stands treated in this alternative. The treated stands will be more open and parklike in the long term. Both treated and untreated stands will continue their development towards maturity. These changes have been previously described in the indirect effects of the Vegetation Strata section (above). Since large blocks of late seral forest are rare in the low elevations (Fites et al. 1993), treatments that improve their condition are considered beneficial, especially to wildlife.

**Cumulative Effects:** Foreseeable future projects will not reduce the amount of 4N,G strata within the analysis area.

### **Fragmentation of Late Seral Forests**

**Direct Effects:** Direct effects will not occur because all 261 acres of 4N,G stands proposed for harvest will retain the large tree element and at least 40% crown closure.

**Indirect Effects:** Long term effects will be substantial. The increase in late seral habitat would reduce the amount of fragmentation present within the project area. With over 60% of the project area in a late seral condition in 50 years, late seral forests would tend to be the dominant habitat type and fragmentation would be associated with the early and mid-seral types.

**Cumulative Effects:** Whale Rock and the other foreseeable future projects would encourage development of late seral conditions.

### **Late Seral Connectivity**

**Direct Effects:** There will be no direct effects in the amount of late seral connectivity.

**Indirect Effects:** Existing corridors along the riparian zones and along the perimeter canyons of the project area would unite with the expanding late seral stands that would dominate the project area.

**Cumulative Effects:** The foreseeable future projects will not affect any corridors.

### **Lava Caps**

A total of 241 acres of lava cap areas would be subject to understory burning under this alternative (see Appendix E).

**Direct Effects:** Direct effects would consist of some minor changes to the vegetation associated with the lava cap plant communities. Some prescribed burn brush mortality would occur. On those lava caps where brush is beginning to dominate the plant community, fire-induced mortality would be most obvious. Removing competition from infringing shrubs will help maintain these unique plant communities.

**Indirect Effects:** Long term effects will occur to a minor extent. The lava cap brush communities will generally resemble their current condition, with shrubs becoming somewhat less conspicuous. Small trees invading the lava caps will be fewer in number due to prescribed burning. The diverse plant communities in the lava caps exist in a fire adapted plant association maintained by intermittent fires. Between fires, this community is often overtaken by shrubs, stunted trees, and in recent years, exotic weed species. These successional cycles are expected to continue with only minor changes.

**Cumulative Effects:** The other projects within the analysis area will not affect the lava caps and there will be no cumulative effects from these projects. Those effects identified above for Whale Rock can be expected to continue.

### **Rust Resistant Sugar Pine**

**Direct Effects:** Direct effects are not anticipated.

**Indirect Effects:** Long term effects would be realized through the removal of the dense understories of white fir and incense cedar, which will help restore the conditions suitable for natural regeneration of sugar pine. By reducing the risk of fire within the stands occupied by rust resistant sugar pine, the perpetuation of their unique genotype is more readily assured.

**Cumulative Effects:** No other activities are planned near rust resistant sugar pine and there will be no cumulative effects from other projects. Those effects identified above for Whale Rock can be expected to continue.

### **Oak Woodlands**

**Direct Effects:** Oak trees are not designated for harvest; however, some minor damage may occur to individual oak trees during harvest of adjacent conifers. Major oak woodland stands will not be entered, thus these areas of concentrated oak will be protected.

It is expected that there will be some losses of individual black oak trees through the post-harvest burning of timber stands. Immature black oak trees may be severely damaged by relatively cool ground fires. Fire may weaken the stem and make the oak more susceptible to pathogens. However, burning also provides a beneficial effect by removing pests that infest the acorn crop and by removing competing vegetation.



**Indirect Effects:** In the long term, the return of a fire regime and stand conditions that mimic those of the pre-European era will return black oak to the extent that it previously held. Reducing the competition from shade tolerant conifers through burning will improve the competitive position of black oak. The more open conditions will favor the black oak trees and this will be evidenced by reduced mortality, increased crown spread and increased acorn production. Over time, black oak will become a larger component of the timber stands.

Without harvest, the areas within Whale Rock identified as black oak woodland stands will slowly change to mixed oak-conifer stands. Since some understory burning is proposed along the perimeter of these woodlands, it is expected that sprouting of black oak will occur.

**Cumulative Effects:** There are no other activities planned that will affect oak woodlands in terms of cumulative effects. The indirect effects from implementing this alternative, identified above, can be expected to continue.

### **Riparian Areas**

**Direct Effects:** Direct effects to riparian areas will not occur because they will be avoided during harvest and post-harvest operations.

**Indirect Effects:** Long term effects to the riparian habitat are expected to occur because of changes in water regimes brought about by the changes in vegetation outside of riparian zones. Decreased vegetation translates to greater surface and subsurface flow of water due to decreased evaporation and transpiration. This increase in water availability is likely to increase the amount of riparian habitat within the project area. The increase in water availability is also dependent on other factors, such as weather, but there would be a net improvement in riparian conditions, if all other factors remain equal.

**Cumulative Effects:** Riparian areas will be receiving protection under this proposal and the other foreseeable future projects within the analysis area, and there will be no cumulative effects.

### **SENSITIVE PLANTS**

For a more detailed description of the potential effects to sensitive plants, see the Biological Evaluation (Appendix E).

**Direct Effects:** Direct effects to sensitive plants and their habitat will occur; because of project design, most of these effects are expected to be beneficial. Lava caps, on which two sensitive species are found, will be incorporated into proposed fuelbreaks. Initial establishment of fuelbreaks may temporarily affect habitat for portions of two occurrences

of Pleasant Valley mariposa lily and yellow bur navarretia, through ground disturbance by equipment. If disturbance occurs during late winter or spring, individual plants might be damaged or killed. If disturbance occurs after seed set, plants are unlikely to be damaged or killed. This disturbance would be offset by the benefit of prescribed fire in maintaining habitat for these species.

Of the 37 known occurrences of sensitive plants in the project area, 21 (13 yellow bur navarretia occurrences and all 8 Pleasant Valley mariposa lily occurrences) would be prescribed burned. The use of prescribed fire poses the same seasonal risk to sensitive plants as does mechanical disturbance; that is, spring burns may damage or kill individuals but fall burns are unlikely to directly affect individual plants. Pleasant Valley mariposa lily would be dormant in the fall and its bulbs secure from the effects of fire. Yellow bur navarretia seeds, buried in the soil, would escape the effects of fire. Forest botanists will review burn plans in sensitive plant areas to aid in minimizing effects.

Eleven known occurrences of sensitive plants are within proposed harvest units. These can be protected through flag-and-avoid measures.

No direct effects are expected to occurrences of Stebbins' phacelia or saw-toothed lewisia. The steep riparian zones that provide habitat for these two plants will not be entered for proposed management activities.

The viability of each known occurrence and the viability of each species will be maintained, or even improved, under Alternative B. This alternative (and all the others except A) has the risk of impacting unknown occurrences of sensitive plants, which may have been missed in surveys and which will only show up when the canopy is removed, making vegetative parts more visible. However, balanced with the overall improvement of habitat, this would not contribute to a significant loss of plant individuals, nor to the demise of the species. Alternative B provides for substantial potential improvements to sensitive plant habitat.

**Indirect Effects:** Understory burning in sensitive plant habitat and near occurrences may contribute to an increase in plant numbers through reduction of competition and ground cover. Exposure of mineral soils may increase the germination and establishment rate for sensitive plants, resulting in increased plant numbers. Corridors for potential exchange of genetic material will be created through burning, thinning and biomassing.

**Cumulative Effects:** Cumulative effects to Pleasant Valley mariposa lily and yellow bur navarretia habitat have occurred and may continue to occur within the project area. These effects are the result of past timber harvest practices, past and present grazing, and the overgrowth of brush due to fire suppression. The increase in the densities of smaller diameter conifers resulting from fire suppression has had the most noticeable effect. This change in forest structure may have resulted in local reductions in the amount of suitable habitat. However, this impact may be short term, especially if recent trends in use of prescribed fire and the increase of wildfire occurrences continue (i.e., both prescribed burns and wildfires are believed to be favorable for these species).



Cumulative effects to Stebbins' phacelia by past activities are unknown. The habitat occupied by this plant is usually within streamside zones or on rocky cliffs and ledges and therefore subject to little disturbance by management activities. The plant seems to tolerate fire well, and no additional cumulative effects are expected.

Cumulative effects also include the ongoing degradation of habitat by exotic weed species. Seeds are introduced by mechanical equipment, and on workers' tools and clothing. Road surfaces channel precipitation into roadside ditches, creating prime habitat for weedy species. Finally, many of the non-native annual forbs and grasses are thought to be the result of historic grazing practices. These annual plants are now naturalized members of the plant community, and would be likely to persist even if logging or prescribed burning were discontinued. The effect of these introduced exotics is not known, though competition, especially at the seedling stage, is likely occurring to some degree.

In addition, exotic species may be inadvertently introduced to the area as a result of project activities. Sale Area Improvement funds would be collected to control the spread of exotic plant species such as star thistle (*Centaurea solstitialis*), white sweet clover (*Melilotus alba*), and common mullein (*Verbascum thapsus*) which are presently becoming established in the project area.

Adverse impacts to sensitive plants from recent (1989-1994) activities have been largely mitigated as required by the LRMP. There is no anticipated change in this trend.

## FISH AND WILDLIFE

For a more detailed description of the potential effects to wildlife, see the Biological Evaluation and Management Indicator Species Analysis in Appendix B.

**Direct Effects:** Prescribed burning, harvest activities and road construction will result in the direct disturbance to some individuals of wildlife species present in the project area. These effects will be minimal and will be controlled by project design, such as limited operating periods and road closures. Prescribed burning within some of the PAC boundaries without first mechanically thinning the stand poses a greater risk of the burn escaping control. Fuel ladders and dense thickets of fir and cedar in the understory could carry heat higher up into the large trees, increasing the risk of damaging the overstory. In addition, high ground fuel loading will make it more difficult to protect large down logs and snags.

**Indirect Effects:** The extensive thinning and prescribed burn program proposed by Alternative B will improve habitat in the Whale Rock area for most wildlife species. Late seral species, such as spotted owl, goshawk and fishers, will benefit from the future increase in available suitable habitat brought about by thinning and prescribed burning, which will allow stands to reach a late seral age at an increased rate. Early seral species, such as deer, will benefit from small, dispersed openings created in the canopy, and



from grasses and forbs that will invade the understory released from heavy slash and duff accumulations. Deer will also benefit from better quality forage through the regeneration of brushfields and oak stands. Prescribed burning of the area along with the fuelbreak system will reduce the risk of catastrophic fire. This will protect and improve habitat for all wildlife species in the area.

Alternative B would reduce the risk of catastrophic wildfire, which would reduce the risk of siltation to downstream fisheries. All activities planned would follow the BMPs for protecting watersheds, so downstream siltation would be minimal.

Guidelines established in the CASPO interim guidelines for snag and down log retention levels would be maintained during harvest activities. There would be incidental snag loss and recruitment due to prescribed burning. Cavity nesting bird densities would be near maximum, as more than 3 snags per acre would be maintained over the project area. However, snag levels within treated units would be likely to decrease over the long term due to reduced recruitment from healthier stands. The possible decrease in snag levels in treated units would have minimal landscape-wide effects on late seral species, since levels in drainage bottoms and on north slopes will remain unaffected by project activities. Snags that would be recruited in the future would be larger in size and therefore more useful to wildlife.

The majority of the project area is low quality habitat for fishers due to private landholdings, high road densities and past management activities. The fisher corridors and use area that are designated for the Whale Rock area are along the South Fork American River and Silver Creek canyons. Few or no activities are planned in these drainages, and road densities would not increase. All roads that are newly constructed will be closed to public traffic. This is expected to have a minimal effect on fishers. Fingers of the fisher use area overlap 187 acres of harvest units; these areas of overlap represent a small percentage of the designated use area. In addition, the units involved are located on ridgetops, which are of little use to fishers. Harvest activities in units that overlap the use area will improve fisher habitat by thinning stands and releasing trees to a more rapid growth rate, thereby reaching a late seral state in a shorter timeframe.

**Cumulative Effects:** Cumulative effects for the Whale Rock project would be linked both to the adjacent Cleveland Fire area and to past and foreseeable future management activities within Whale Rock project area. Wildlife habitat for the majority of species is not expected to recover within the Cleveland Fire area for at least 30 years. The expected results of implementing large scale fuels reduction in the Whale Rock area will greatly improve wildlife habitat while also reducing the risk of a stand-replacing fire. This will provide and protect habitat for wildlife while the Cleveland Fire area recovers.

Overall, Alternative B will have a positive cumulative effect on wildlife habitat by substantially reducing the possible loss of habitat due to a stand-replacing wildfire. However, prescribed burning over consecutive years may reduce snags and downed woody material on the forest floor. This may have a cumulative impact on species that depend on those materials, such as spotted owls and fisher. Snag levels on north slopes

and in PACs should remain unaffected by this alternative, as minimal activities are planned in these areas. Should snags fall below desired levels, snag recruitment may be necessary to replace incidental losses.

The proposed prescribed burning will also add to habitat improvement burns that have occurred in the area in the past. This will create additional opportunities to combine efforts with California Department of Fish and Game in Pacific Deer Herd habitat improvements.

In the long term, the reduction of the risk of catastrophic fire occurring in the project area will outweigh the possible negative effects to wildlife. As stated in Alternative A, if a large wildfire occurred within the Whale Rock area, especially in combination with the area already consumed by the adjacent Cleveland Fire, it would have devastating effects on many wildlife species.

## SNAGS AND DOWN LOGS

**Direct Effects:** Short term direct effects upon snags and down logs would occur. This alternative would require the falling of snags that are adjacent to haul roads if the snags represent a hazard to the road. In addition, since the existing snag inventory is higher than the LRMP guidelines, excess snags would be felled to meet fuel and safety concerns within the general harvest areas. Once felled, the snags will be removed if their tonnage levels exceed the LRMP guidelines.

Based upon information from the 1994 snag survey and stand exams, it is estimated that an average of 14 snags per acre (19 ft<sup>2</sup>/acre basal area) exist on the project area in natural stands. Since the CASPO 20 ft<sup>2</sup>/acre basal area for snags are not met in the project area, the minimum desired snag levels as defined in CASPO (EA III-3) is 8 snags per acre. Thus the existing snag levels exceed the LRMP guidelines by an average of six snags per acre.

Assuming a roadside hazard strip width of 125 feet on each side of a road, the hazard strip would average 30 acres per mile and would contain approximately 420 snags per mile. However, because of height and lean, and past salvage efforts, this strip contains less than the average number of snags per acre, so that the actual number of snags to be felled is estimated at 150 per mile. Under this alternative, 30 miles of road would be treated and 4,500 snags would be felled along the road system, representing a reduction of approximately one snag per acre within the harvest units. Because not all snags in the roadside strip would be considered hazardous to traffic on the road, the actual numbers of snags felled in this zone would be somewhat less than the above data indicate.

An average of an additional snag per acre (4,000 total) within the harvest area would be felled and removed to meet fuel and safety concerns. The falling of a total of 8,500 snags would represent a reduction of an estimated 8.0% of the snags within the project



area. After harvest, snags within harvest areas would average 8 per acre, with a basal area of approximately 15.2 ft<sup>2</sup>/acre (1.9 ft<sup>2</sup>/tree), thus meeting CASPO guidelines.

Additional direct effects on snag numbers are likely to occur as part of the prescribed burning. With low intensity prescribed burning, the majority of existing snags would be retained, although a few would be consumed by the burn. In addition, some snags would also be created by the burning, although snag replacement may be delayed for 2-3 years. The specific numbers of lost and created snags is impossible to predict because of variations in tree age, size, species, fuel moisture levels, location of individual snags and duff depth. However, it can be presumed that in the long term, the number of snags remaining within the prescribed burn stands will closely approximate the natural range of variability that existed prior to the time of effective fire exclusion.

Since the areas selected for harvest tend to be concentrated on west and south aspects and upper ridges, the prescribed burning will primarily occur in these areas. The burning will generally not affect the north slopes or the drainage bottoms; thus, outside of harvest and prescribed burn areas, the snag levels will be maintained at the existing levels (based on analysis area averages, 14 snags per acre).

Down logs are at some risk from prescribed burning. It is anticipated that those logs consumed by the fire (most of which will be in the smaller size class) would be quickly replaced by snags falling after the burn is completed. These newly created logs would be in a younger age class than those consumed by burning and would not immediately have the same ecological function. Cyclic burning would keep the numbers depressed (see Appendix F).

**Indirect Effects:** Indirect effects would occur upon snag numbers through a slight reduction in fuel loads, which would decrease wildfire and prescribed fire intensity. Reduction in future fire intensity would reduce snag and down log recruitment.

Reduction in tree numbers and stand density through harvest would reduce the competition between trees and the development of future snags. There would be a dramatic decrease in the number of new snags formed, once stand density is re-established within the normal range of variability. The lower numbers of snags would then approximate the number of snags per acre that existed prior to the development of over-dense stands of timber.

**Cumulative Effects:** Other foreseeable projects within the analysis area will maintain existing snag levels, thus no appreciable effects are expected beyond those identified above.

## **FIRE AND FUELS**

Under Alternative B, 14.5 miles of fuelbreak will be constructed, and 6,300 acres will be prescribed burned upon completion of harvest operations. It is estimated that it will



take 7 years to complete the first burning cycle. Additional maintenance burns will be required after project completion to manage the ongoing fuel buildup.

**Direct Effects:** Under this proposal, approximately 6,300 acres would achieve a significant reduction in fuel loading through prescribed burning and harvest. This represents 44% of the total project area, located on strategic ridgetops and southern exposures critical to future prescribed burns and wildfire suppression actions. Stand structure will be modified significantly by the removal of ladder fuels on the treated acres. Stand composition will also be modified toward a more fire tolerant forest through a combination of timber harvesting of shade tolerant trees and prescribed burning.

Slash generated by harvest operations will be disposed of by purchaser treatment and prescribed burning. Approximately 67,169 tons of biomass will be removed from the harvest areas, a major reduction in fuel loading. If this biomass were to burn in a wildfire, it would be equivalent to the smoke and energy released from all the woodstoves and fireplaces in the Pollock Pines area for a period of 9 years and 4 months.

High concentrations of downed logs and snags left to meet the CASPO guidelines may preclude the use of prescribed fire in certain areas due to the risks to employees conducting the burns, and the risks of an escaped burn. The felling of hazardous trees along 30 miles of roads will make fire suppression and burning operations safer when these roads are used for firelines.

With treatment in the PACs, an additional two miles of secondary ridgetop will have fuels reduction between Telephone Ridge and Peavine Ridge. The Big Bend Ridge would also be treated with fire (but no harvest) for an additional one-half mile on the northwest end of the fuelbreak, extending its effectiveness. Burning the PACs would also widen the Big Bend, Jaybird and Telephone Ridge fuelbreaks, eliminate bends which make fire control difficult, and make the fuelbreaks much more effective for future fire suppression purposes.

**Indirect Effects:** Implementation of this alternative would require prescribed burning of approximately 900 acres per year. The current District workforce is adequate to execute a program of this size.

There is a risk of fire escapes during prescribed burning. The LRMP standards and guidelines and management requirements for this area would be used to develop the proper burning prescription to reduce the risk of large fires yet maintain the integrity of the resources. The District has successfully prescribed burned approximately 10,000 acres over the last 17 years for similar objectives.

Alternative B will significantly reduce the fire hazard on approximately 6,300 acres (see Appendix F), thus the size of a catastrophic, stand-replacing wildfire will be reduced to no more than 7,400 acres (as compared to 17,800 acres under Alternative A). As Whale Rock becomes more resilient to stand-replacing wildfires, forested landscapes adjacent

to the project area will be afforded additional protection from the spread of fire from within the project area.

The proposed activities in this alternative are sufficiently large as to reduce the likelihood that a high intensity wildfire would destroy the harvested stands or adjacent stands. Since the probability of a large fire is reduced in this alternative, the risk to and from private residences is also reduced. Due to the location of project activities, private residences would have increased protection from wildland fires originating above and to the north of their location. Protection from fires starting in the canyon below or to the south of the residences would remain the same. Increased protection to public lands from fires originating from within the developed areas would be realized to the north and upslope of the developments, while areas downslope and to the south would remain unchanged.

**Cumulative Effects:** The only projects that have any additional measurable effect on the existing fire hazard inside the Whale Rock Project are the ongoing prescribed burning program and the herbicide release program. Over the last 17 years approximately 2,000 acres have been understory burned at least once in the project area. Both of these programs have the potential to provide significant positive benefits to the Whale Rock area from a fire and fuels management standpoint. However, inconsistencies in funding continue to adversely affect the ability of both programs to contribute to their full potential and make a significant difference. Still, approximately 300 acres are likely to be treated in the Whale Rock area per year, thus providing some minor reductions in fuel loads.

## AIR QUALITY

**Direct Effects:** Alternative B proposes prescribed burning, which will result in an increase in PM 10 (particulate matter 10 microns or larger in size) emissions in the future. Approximately 2,600 tons of PM 10 would be emitted from prescribed burning, spread over a total of 350 days during a 7 year period. An increase in equipment emissions and fugitive dust (from vehicle traffic on unsurfaced roads, road construction and reconstruction, and skidding and log landing) will occur. These effects will be mitigated with dust abatement.

Under this alternative the opportunity to reduce the fire hazard will occur on approximately 6,300 acres; however, fuels will continue to increase over the remainder of the land in the project area. The effects of treating 6,300 acres will be sufficient to alter the size of a potential catastrophic wildfire within the project area. Prescribed burning will reduce the fire hazard on approximately 900 acres annually for the first 7 years, and would average 377 tons of PM 10 per year during the 50 days of burning per year.

During the flaming phase of prescribed burning, air quality degradation could exceed Federal and State standards as far as 3 miles downwind of the event. During the smoldering phase, air quality degradation would only be affected at and adjacent to the site. At night, with the diurnal wind change, air quality would be affected for 15 miles



down canyon from the source as the night inversion traps the smoke below it. Weather patterns vary every winter. Judging by the past 16 years, it can be anticipated that for a minimum of 3 days to a maximum of 15 days each winter, smoke would travel into surrounding communities during night hours. Smoke management will include visual monitoring, and monitoring of atmospheric conditions, fuel and duff moisture content, ignition techniques, rapid mop-up, season of burn and wind shifts.

Another issue related to current air resource regulation is the continued ability of the Forest Service to burn on non-permissible burn days. With a program of this size, it is possible that at least 5 days each year, it would be necessary to burn on a non-burn day. To date this has not been an issue; however, if air quality regulations change, it may become one.

**Indirect Effects:** With treatment, the largest probable catastrophic wildfire would probably be around 7,400 acres. Emissions from this would be 5,790 tons of PM 10, spread over a 10 day period. An indirect effect of a catastrophic wildfire would be the increase in PM 10 material. Overexposure to PM 10, smoke and carbon monoxide can have adverse effects on human health. Wildland firefighters are at a much greater risk from these effects than the public since they are often in dense smoke for long durations of time.

**Cumulative Effects:** The ongoing District prescribed burn program will treat approximately 160 acres every other year within the Whale Rock area. This understory burning would be spread over a 3 week period. The additional emissions from this program are negligible.

## VISUAL RESOURCES

**Direct Effects:** The direct effects on the areas seen within the foreground and middleground viewsheds for Highway 50 and the South Fork of the American River will be the short term noticeable impacts associated with timber harvest activities. These impacts will be somewhat more noticeable within the foreground areas and less in the middleground views. Within a year or less, as grass and other ground cover resprout and needle cast covers the forest floor, these impacts will become less noticeable.

The thinning of even-aged plantations within the viewshed areas will tend to break up the uniform green color and textured look of the plantations, giving them the appearance of a more open forest. Individual trees, patches of brush, open grassy areas and stands of older trees will become more noticeable, thus adding to the variety of the viewed landscape.

**Indirect Effects:** Changes in form, line, color and texture will eventually achieve the desired visual condition of a more open and natural appearing landscape, which will enhance the views seen from Highway 50 and the South Fork of the American River.



**Cumulative Effects:** There will be no additional foreseeable cumulative effects to the visual resources beyond those described above.

## TRANSPORTATION

**Direct Effects:** There would be approximately 1.7 miles of new construction road, 29.3 miles of reconstruction road (including 17.5 miles of rocked road) and 50.4 miles of maintenance road under Alternative B. Accessibility for fuels treatment and fire suppression would be enhanced due to new road construction and reconstruction. Unnecessary roads will be identified and obliterated. The arterial and collector road systems within the analysis area have been developed to long term management design standards and should be able to safely accommodate the increases in traffic flows. The concern for user safety would be on the single lane local roads where the increase in traffic volumes for log trucks, chip vans and support vehicles could create traffic safety problems. These problems will be mitigated by signing and traffic control (FSM 7731.15 - Signing and Traffic Control Devices, FSH 7109.31), and by road and public use restrictions (C5.12 - Use of Roads by Purchaser, C5.122 - Road Restrictions, and CT6.33 - Safety).

**Indirect Effects:** Surface replacement deposits would be collected for log and chip van hauling; these are necessary for perpetuating the life of the surfaced roads. Should a catastrophic wildfire occur, increases in the runoff into streams and drainages would exceed the design capacity of the existing culverts for normal operation. Additional reconstruction and new construction would be necessary, including replacing existing culverts with larger ones to accommodate the increased flows.

**Cumulative Effects:** Cumulative effects would be minor. No new roads and no reconstructed roads will be necessary on any of the other foreseeable future projects occurring within Whale Rock. The normal annual routine maintenance of roads within the project would continue.

## RANGE

Direct, indirect and cumulative effects for range will be minor, since only 10% of the active Big Hill Allotment is in Whale Rock.

**Direct Effects:** Prescribed burning, thinning and biomass operations will open previously dense stands of mature and pole-sized timber and reduce dead and down material. All these activities have a positive effect on transitory range by providing openings, thus increasing forb and grass production, as well as rejuvenating browse species and making them more palatable to livestock. This increase in available forage would be maintained as prescribed fire is periodically introduced into the landscape.

The increase in forage on upland ranges will improve cattle distribution and concentrate cattle away from riparian areas.

**Indirect Effects:** Livestock grazing will supplement to a minor degree the effects of prescribed fire by maintaining browse species in an available, palatable form for both cattle and deer.

**Cumulative Effects:** There will be no foreseeable cumulative effects to range from the other projects in Whale Rock; only those effects noted above can be expected to continue.

## RECREATION

**Direct Effects:** Project activities would have both adverse and beneficial effects on the recreation experience. Dust, noise, smoke and increased traffic flow from project activities would negatively affect some recreationists. Beneficial effects would result from thinning and prescribed burning, which make timber stands more open. The majority of the area is used by hunters, and the more open timber stands would enhance deer hunting opportunities. Areas not currently accessible on foot would become increasingly open to recreationists as more thinning and burning are implemented. Road density would increase slightly. Off-highway vehicle use would be temporarily curtailed during project activities as areas were closed for short periods of time.

**Indirect Effects:** Personal-use firewood would become more available as timber harvest is implemented. This woodcutting would incrementally assist in the reduction of fuel loads.

In general, the area would be more attractive and inviting to the casual forest visitor. As recreational use increases, so does the risk of accidental fire starts. However, the risk of a large stand-replacing fire would be decreased through the reduction of stand densities and fuel loads.

**Cumulative Effects:** There will be no additional foreseeable cumulative effects to recreation from the other projects occurring in the Whale Rock area. Those effects discussed above can be expected to continue after the implementation of Alternative B.

## CULTURAL RESOURCES

The number of sites within ground-disturbing project activity areas varies from 24 to 38 in Alternatives B through E, with a core of the same 21 sites overlapping into each of these "action" alternatives; 38 are within proposed project areas in Alternative B. Unsurveyed acres where ground-disturbing activities are proposed vary from zero to 430 acres in

Alternatives B through E; in Alternative B, a total of 315 acres remain unsurveyed. Since 95% of the proposed activity areas have been surveyed for this alternative, the effects of implementing Alternative B can be confidently assessed. Unsurveyed ground will be spot-checked prior to all ground-disturbing activities to further confirm the predictions regarding resources of interest as defined in Chapter III, and to further refine the Forest's inventory strategies. If new archaeological sites are discovered, they will be protected by flag-and-avoid measures as outlined in the Memorandum of Understanding between the Eldorado National Forest and the California State Office of Historic Preservation; thus, no additional effects will need to be analyzed. Sites will be monitored if project activities occur within 50 meters of their location.

**Direct Effects:** Ground-disturbing activities in the vicinity of archaeological sites have the *potential* to disturb or destroy cultural resources. A total of 38 of the 70 total sites within Whale Rock are located within areas of proposed ground-disturbing activities in Alternative B. Twenty-four of these sites are prehistoric, 10 are historic and 4 have mixed historic and prehistoric components. Some are located in harvest units only; some are situated outside of harvest units but adjacent to roads; some are next to roads within harvest units and might be affected by either harvest activities or road work; and others are in areas which will be subject to prescribed burning. Seven sites are scheduled for evaluation as described in Chapter II. Protection or mitigation of cultural resource sites are included as part of project design.

All of the fuelbreaks scheduled for harvesting have been surveyed. One-half mile of road needs archaeological survey prior to the initiation of road work. During roadwork operations, sites will be protected or mitigated from planned activities. A total of 315 acres remain unsurveyed in other project activity areas in Alternative B, the majority in areas slated for prescribed burning. Of the unsurveyed prescribed burn areas, only 75 acres are considered to be in sensitive areas, and only one recorded historic cabin and hydraulic mine site (FS No. 05-03-55-64) has the potential to be adversely affected by the burning. Although this site is severely disturbed and the cabin has collapsed, the original record notes hand-hewn cedar cabin supports and beams; wood logs which were part of the main cabin; wooden fence posts; and a flume presumed to be constructed of wood. All of these cultural objects could be destroyed by an understory burn. They will be protected by special measures such as hand piling and controlled burning of piles. The low intensity fires set during prescribed burning should not adversely affect prehistoric sites within the area. Overall, the reduction of fuel loads will reduce the risk of a catastrophic wildfire; this alternative should therefore have a beneficial effect in that sites are less likely to be damaged during suppression efforts.

**Indirect Effects:** Improved access often leads to an increase in site vandalism and inadvertent damage to sites. Since the improved access in this alternative is slight and all newly constructed roads will be closed, these indirect effects should be minimal. However, sites might continue to degrade in the vicinity of all existing system roads, as there are no plans to permanently close or block these when activities in the area cease. Continued monitoring of sites will aid in reducing these effects.



Thick stands of brush are in some cases helping to protect fragile and significant cultural resources by obscuring them from view and severely hampering pedestrian traffic in their vicinity. Since the potential damage to sites is considerably greater from heavy equipment used in firefighting situations than from vandalism, reducing fuel loads as proposed in this alternative is considered a beneficial effect. However, in particularly sensitive areas, brush will be left in place to obscure significant resources. As the area becomes more open and accessible, additional opportunities will be available to interpret cultural resources for public education and enjoyment. Educating the public should lead to a reduction in site vandalism.

An opportunity also exists to study the effects of prescribed burning on the area, particularly as it relates to archaeological resources and the prior burning practices of both Native Americans and sheepherders. Archaeologists will coordinate with fire and fuels specialists in collecting data and contributing to the District's on-going burning studies.

**Cumulative Effects:** No foreseeable future activities will adversely affect any cultural resources in Whale Rock. Prior activities in the area have had varying levels of cumulative effects on the archaeological sites in the project area. These include light to moderate site degradation resulting primarily from logging and erosion. Other agents of site degradation noted on sites include rodent burrowing, vandalism, dispersed recreational camping, deposition and fire suppression damage. Many of these impacts can be expected to continue unless some intervention is enacted. Continued monitoring of archaeological resources within the project area will allow management intervention at the earliest opportunity for those sites that continue to be threatened.

Archaeological properties have inherent value in reflecting past land use, lifeways, and environmental or ecosystem management. An opportunity is present to evaluate and interpret some of these sites as described in Chapter II, and to increase the public appreciation for prior land use in this region of the Sierras. Implementing this alternative could therefore help to reach the desired condition for some of the heritage (cultural) resources in Whale Rock (i.e., preservation, interpretation and research). Any evaluation and mitigation work within Whale Rock will add to the information base and increase the quality of public education and enjoyment. The information obtained through evaluation will contribute to the advancement of knowledge and understanding of the area's cultural history and will aid in addressing questions important to regional researchers.

## HISTORICAL LANDSCAPE

The Historical Landscape reflects to a large degree the desired condition for Whale Rock. The historical landscape in the Whale Rock area was more open than at present, with less dense and more widespread stands of pine, more stands of black oak, and less occurrence of incense cedar and fir. This open landscape is believed to have been maintained to a large extent by Native American burning practices. Assessing the effects of each alternative

on the historical landscape is therefore one way to measure each alternative's potential to achieve the desired condition.

**Direct Effects:** Implementing this alternative will have substantial effects as the widespread prescribed burning facilitates moving toward the Historical Landscape/Desired Condition. Several areas in Whale Rock, notably in the southwest portions of the analysis area south of Rice Cabin, already approach the desired condition and historical landscape. This area has been systematically burned since 1978 (in 1978, 1979, 1985 and 1992). This parklike area of the forest has a low understory, primarily of bear clover, with wide, open spacing between trees.

It should be noted that a similarly treated area on Icehouse Road near the Cleveland Corral Information Center was one of the only areas to survive within the Cleveland Fire. As one drives up Icehouse Road, this is the only part of the lower South Fork American River Canyon within the fire area that is still green and still timbered. The wall of 200-foot flames, common within the Cleveland Fire, dropped to a height of 4 feet when it reached this previously prescribed burned area. Immediately after passing through the treated area, the fire regained its momentum and intensity, consuming all the untreated, overstocked stands in its path. Implementing a large prescribed burning program will thus significantly enhance the sustainability of the Whale Rock area and aid in improving forest health.

Thinning large areas will open the forest up, and allow those trees that are left standing to reach maturity at a faster rate than if no harvesting were to take place. Burning will help keep the landscape open, encouraging the expansion of pine and black oak, while reducing incense cedar and fir. The Whale Rock area will maintain more suitable habitat for deer and other wildlife species.

**Indirect Effects:** As this area becomes more resilient to stand-replacing wildfires, forested landscapes adjacent to Whale Rock will be afforded additional protection from the spread of fire from within the analysis area.

**Cumulative Effects:** The other foreseeable projects that will occur in the area in the future will incrementally assist in moving the area toward a more open landscape. This effect is, however, essentially negligible.

## SOCIOECONOMICS

**Direct Effects:** Implementing Alternative B would sanction the continued expenditure of funds for the preparation, administration and maintenance of forest health activities. The total cost of proceeding with this alternative is estimated to be \$3,361,922 (refer back to Table 26). Total receipts to the treasury are expected to approach \$3,900,000, while receipts to the county would be an additional \$1,300,000. An estimated 180 full-time, year-round jobs would result from this alternative. The sale of 22,400 MBF of timber represents about 16% of one year's mill capacity for the largest mill in the county



and about 50% of mill capacity for one of the smaller mills in the county. Since road reconstruction, construction and maintenance would be a part of this project, annual road maintenance costs paid for with tax dollars would be unnecessary on Forest Service roads within the project area. Reconstruction would reduce the costs of future maintenance. These cost savings are estimated at approximately \$5,000 a year.

**Indirect Effects:** Indirect employment created by this alternative is estimated at 112 full-time, year-round jobs.

The reduction in the costs of fire suppression associated with the proposed fuels reduction on 6,300 acres is substantial. According to District fire personnel projections, because of the fuels treatment, the largest potential catastrophic wildfire would not exceed an estimated 7,400 acres. This is about a 10,600 acre reduction in potential catastrophic burn acreage when compared to the No Action Alternative. At a suppression cost of \$1,000/acre, a potential savings of \$10,600,000 in future fire fighting costs is embodied in this alternative. In addition, the reduction in fire size would offer substantial savings to the timber resource within the project area. With an estimated reduction in the loss of future timber values of \$10,000/acre, there would be a total savings of about \$106,000,000 to the timber resource.

A prescribed burning program that affects large acreages is recognized as being a key to catastrophic fire prevention; however, the prescribed burning program for most of the Forest has not been effective on a large scale because of a lack of consistent funding. It has been difficult to plan or effectively implement a prescribed burning program, partially because of this inconsistency. Even though the program has fluctuated through the years, the prescribed burning accomplished has been effective in retarding the spread of, or completely stopping, at least 4 wildfires that started inside areas of Whale Rock which had been prescribed burned. This alternative funds prescribed burning operations through dollars collected from timber receipts, thus consistent funding of the prescribed burning program is reasonably assured for the next 5 to 10 years.

**Cumulative Effects:** The implementation of the harvesting in this alternative would reduce to some degree the timber supply shortfall brought about by the Eldorado National Forest's lack of sale offerings. The harvesting and planned prescribed burning would reduce the costs of future prescribed burning of adjacent areas. The economic effect of returning receipts to the U.S. Treasury and local county government is further enhanced by the reduction in the likelihood of expending taxes in the form of fire suppression and resource rehabilitation dollars on these same or adjacent lands.

## SUMMARY DISCUSSION OF ALTERNATIVE B

Alternative B was designed to address Issues 1, 3, 4, 9, and 11. These issues are addressed by treating an area sufficiently large as to reduce the risk of insect epidemics and large stand-replacing fires; by offering increased protection to and from private residences from wildfire; by enhancing plant habitat on the lava cap through prescribed burning; and by



enhancing wildlife habitat conditions, particularly for the Pacific Deer Herd. Alternative B is further designed to maintain air quality and scenic visual qualities, and to avoid adverse impacts to cultural resources, sensitive plants and owl habitat, while providing for an economically feasible means to reach the desired condition in the Whale Rock area.

This alternative provides an aggressive combination of timber and biomass harvesting for the purpose of preparing over 6,300 acres for prescribed burning. More than 14 miles of fuelbreak would be constructed and nearly 600 acres of 35-year-old plantations would be treated. This treatment poses some potential short term soils displacement and compaction problems because of the extensive acreage being treated, but the mitigation efforts of landing, skid road and temporary road obliteration reduce the concern to less than that posed by a predicted catastrophic fire.

Cumulative watershed effects are second highest under this alternative. Four of seven watersheds would be over the TOC for a period of 5 to 10 years. This alternative proposes a high timber harvest level because of the need to provide maximum preparatory treatment prior to burning. The greater acreage being treated poses greater risk to sensitive plants and cultural resources; however, these risks can be effectively mitigated through flag-and-avoid procedures. The benefits to wildlife are expected to outweigh the higher level of disturbance. Many of the high priority areas for wildlife habitat improvement work are treated, but not all. Nearly 600 acres of PACs are prescribed burned, thereby providing substantial protection within these key wildlife areas.

There would be a more rapid development of late seral forest conditions because of the removal of small, shade tolerant trees currently growing in over-dense situations. There is a 10,600 acre reduction in predicted fire size compared to Alternative A. Since fuels treatment effectively reduces the estimated size of a potential catastrophic fire to about 7,400 acres, it is more likely that all stands within the project area can be perpetuated without loss to wildfire. Air quality would be adversely affected because of the impact of an intensive prescribed burning program.

This alternative would cost roughly \$3,360,000 to implement, but more than \$5,200,000 would be directly returned to the public through timber receipts. Approximately \$1,300,000 would be returned to local counties for roads and schools. By reducing the incidence of wildfire, it is expected that over \$10,000,000 would be saved from reduced future fire fighting, and in excess of \$106,000,000 in future timber losses.

Alternative B offers the opportunity to move a third of the total project area toward its historic condition, thus the desired condition for the Whale Rock area would be met in large measure by implementing this alternative. Though no alternative will fully recreate the historical landscape, this alternative does begin the process on a scale large enough to substantially improve the health of the Whale Rock area. Implementing this alternative also provides the opportunity to study burning patterns on a landscape-wide level and to address issues regarding sustaining forest health throughout the wildfire-prone forests of the west.

## **ALTERNATIVE C: WILDLIFE MANAGEMENT EMPHASIS WITH ADAPTIVE MANAGEMENT STRATEGIES**

The emphasis of this alternative is to provide sustainable wildlife habitat. Habitat will be protected and enhanced through project activities including thinning, biomass removal and prescribed burning in plantations and natural stands. This alternative proposes thinning of 1,124 MBF from 562 acres of plantations and 11,840 MBF from 1,986 acres of natural stands, including thinning of 141 acres of natural stands inside of spotted owl Protected Activity Centers (PACs) under the adaptive management strategies provided for in the interim CASPO guidelines. Three hundred fifty-two non-harvested acres within PACs will be prescribed burned. Fuels treatments will occur on a total of 5,623 acres (2,086 harvested acres; 3,075 non-harvested acres). Machine piling would occur on 462 acres. There will be no shaded fuelbreaks in this alternative. Alternative C is described in detail in Chapter II.

The direct, indirect, and cumulative effects of implementing this alternative are addressed below by resource area.

### **GEOLOGY AND SOILS**

The effects of this alternative are less than those identified for Alternative B; the key difference for geology and soils is fewer harvested acres in Alternative C. However, the types of effects which will result from project activities in this alternative are essentially the same as described in Alternative B, except where discussed below.

**Direct Effects:** Although a relatively large number of acres are proposed for burning in Alternative C, the number of acres to be harvested is substantially less than in Alternative B. In addition, 0.7 fewer miles of new road construction are planned for Alternative C. For this reason, the short term impacts on the soil resource will be less than in Alternative B. The remainder of the direct effects are the same as those addressed in Alternative B.

**Indirect Effects:** These effects are the same in Alternative C as described for Alternative B.

**Cumulative Effects:** Very little net increase in soil loss or decrease in soil productivity will result from implementation of this alternative or any foreseeable future activities in the Whale Rock area, since BMPs will be followed and erosion control measures will be provided. Positive results to geology and soils brought about by activities in Alternative C should outweigh any negative cumulative effects by reducing the risk of catastrophic wildfire and thus the risk of cumulative adverse impacts to these resources.



## HYDROLOGY

Alternative C has fewer hydrologic effects than Alternative B. Alternative C will involve harvest of different areas and fewer acres than Alternative B. This alternative proposes harvest of a total of 2,548 acres (2,109 less than B), approximately one-half as much harvesting as in Alternative B. The reduction in harvest results in the need for approximately 0.7 fewer miles of road to be built. A total of 5,623 acres will be prescribed burned in Alternative C, 680 fewer acres than in Alternative B. The key differences between Alternative C and Alternative B are found in the effects described below.

**Direct Effects:** The magnitude of the direct effects is expected to be less under this alternative than Alternative B. The substitution of prescribed fire for harvesting on many of the treated acres decreases the risks of compaction, reduced infiltration rates and other direct effects of harvest.

Other direct effects to water can be expected as a result of logging near hydrologically sensitive areas; reducing ground cover through prescribed burning or road construction; and from road construction or reconstruction at stream crossings, as described in Alternative B. Two Class III streamcourses are located within harvest areas in Soldier Creek Watershed (nine less than in Alternative B); three within Pacific House (two less than in B); five in Jaybird (two more than in B); two in Round Tent (four less than in B); nine in Riverton Watershed (compared to 14 in B); and four in Sunset (two more than in B). Beneficial uses of water will be adequately protected by LRMP requirements for each of these Class III streams, using a 100-foot equipment exclusion zone, since these specific areas have low drainage densities (except as specified below for Riverton and Round Tent), and the harvest areas containing the streams are located high on slopes away from most beneficial uses. Any sedimentation that may occur in these areas will most likely be filtered out prior to reaching the main stem in each watershed.

Some of the same concerns exist within Riverton and Round Tent Watersheds as described in Alternative B. Within Riverton, many of the streamcourses that were of concern in Alternative B are again located in harvest areas in Alternative C. However, there is a lower level of concern since the harvesting in this alternative occurs within patches, as opposed to the continuous areas of harvest planned in Alternative B. Similar concerns exist for T11N R13E, Section 25, and the same expanded streamcourse protections will be used in this area as described in Alternative B. Harvest areas in Round Tent Watershed include two Class III streamcourses (four less than in Alternative B). These harvest areas are situated in sensitive areas similar to those described in Alternative B, and the same expanded streamcourse protections will be used for T11N R13E, Section 12. Given these requirements, there will be a very low potential for direct impacts to water quality.

Although harvest acres in Riverton watershed are the same as in Alternative B, the percentage of watershed acres proposed for prescribed burning is an increase of 1% over Alternative B. This is also true for Sunset Watershed, where the percentage subject



to harvesting (5%) is the same as in Alternative B, but the percentage of watershed acres proposed for prescribed burning is an increase of 1% over Alternative B.

Proposed new road construction consists of one mile spread over four watersheds (Appendix G). Direct effects from road construction are expected to be minimal in Lower Silver, Sunset and Jaybird Watersheds since there are no new stream crossings. The same stream crossings will be used in Round Tent and Pacific House Watersheds as described in Alternative B, with the same effects and suggested protective measures. Road reconstruction will improve control of road surface runoff and correct some of the current sedimentation problems associated with the existing road system. The same watershed restoration work as described in Alternative B applies to Alternative C. Identified projects address existing compaction problems and sedimentation impacts and serve to stabilize sites of active erosion or stream sedimentation, thereby improving watershed conditions.

**Indirect Effects:** Indirect effects are basically the same as in Alternative B, but slightly less extensive given the additional edge effect that is obtained through the more patchlike harvest.

**Cumulative Effects:** The results of the Cumulative Watershed Effects (CWE) analysis for Alternative C are displayed in the following table (see Appendix G for limitations and assumptions used in the CWE model):

Table 29. Alternative C Cumulative Watershed Effects								
Watershed	Established TOC(%)	%ERA - Present/Projected						
		1995 (present)	1998	1999	2000	2001	2002	2003
Pacific House	10-12	5.1	4.9	4.8	5.1	5.0	5.0	4.9
Soldier Creek	12-14	12.4	11.3	11.3	11.3	11.1	11.4	11.3
Riverton	10-12	12.9	10.4	9.9	9.7	9.3	9.1	8.9
Lower Silver	10-12	7.0	6.6	7.0	6.9	6.9	6.7	6.7
Round Tent	12-14	7.3	6.8	8.6	8.5	8.5	9.6	9.1
Sunset	10-12	8.7	9.0	8.8	8.0	7.7	7.5	7.7
Jaybird	14-16	8.2	7.9	11.6	15.0	17.6	14.6	14.1

A review of the above table indicates that Soldier Creek and Riverton Watersheds are currently at or above the established threshold of concern (TOC). As a result of the proposed alternative, Jaybird Watershed would also exceed the estimated TOC. For Soldier Creek and Riverton, the reduction in predicted %ERA compared to Alternative B would occur because of the absence of fuelbreak construction in these watersheds, as well as major reductions in proposed acreage of prescribed burning. The absence of proposed fuelbreak construction in Jaybird Watershed is offset by a nearly equal increase in proposed harvest acreage within natural stands. The following summarizes the *differences* in CWEs between Alternative C and Alternative B by watershed:

Riverton Watershed: Implementing Alternative C would result in harvesting about 5% (520 acres) of the total watershed acres, compared with 581 acres (also about 5%) in Alternative B. Because of the proposed timing of the activities, Riverton would recover to below threshold disturbance levels in 1999 and would remain below threshold with the implementation of Alternative C. However, from 2000 to 2004, Riverton Watershed would be considered to be a high risk for adverse CWE with disturbance levels of 80-100% of TOC. Alternative C will not increase the potential for continued adverse CWE within the Riverton Watershed. The watershed will continue to recover to disturbance levels lower than those that presently exist.

Soldier Creek Watershed: Implementing this alternative results in harvest of about 4% (139 acres) of the total watershed acreage, a decrease from Alternative B of 718 acres or 21%. Prescribed burning will occur on 25% (856 acres) of the total watershed acreage, a 3% decrease (88 acres less). This watershed would recover to a disturbance level below threshold during 1998 (4 years sooner than in Alternative B) and would remain there even with implementation of this alternative. Alternative C will not increase the potential for continued adverse CWE within the Soldier Creek Watershed, and disturbance levels will continue to decline from existing levels.

Round Tent Canyon: Alternative C results in harvest of about 17% (406 acres) of the total watershed area, a reduction from Alternative B of 750 acres or 31%. Prescribed burning will occur on 45% (1107 acres; a decrease from Alternative B of 10%) of the total watershed acreage. While Round Tent Watershed remains below threshold levels of disturbance, it should be noted that the maximum disturbance level occurring in 2002 would place the watershed at 80% of TOC, a level considered at high risk for adverse CWE. Round Tent would remain at this risk level for only that year and would recover back to a moderate risk level the following year.

Jaybird Watershed: Alternative C results in harvest of about 51% (840 acres) of the total watershed area, a reduction from Alternative B of 76 acres or 5%. Prescribed burning will occur on 51% (844 acres) of the total watershed acreage, a 2% reduction. The level of disturbance proposed in Alternative C is a substantial increase for the watershed. The %ERA resulting from the proposed activities almost doubles existing disturbance levels. The implementation of Alternative C will likely contribute to the potential for adverse CWE within the Jaybird Watershed for roughly 5 years (2000-2004), with the watershed recovering to a disturbance level below threshold by the year 2005.

Sunset Watershed: The cumulative effects of Alternative C would be slightly lower than what is proposed under Alternative B. Under Alternative B, Sunset would be considered at high risk for adverse CWE until the year 2002, but under Alternative C disturbance levels would recover to a moderate risk level one year

earlier. Alternative C will not increase the risk of adverse CWE above the high level that presently exists within the Sunset Watershed.

Lower South Fork American River Basin: Conclusions regarding basin condition are the same as described in Alternative B.

The reduction in catastrophic fire potential is substantial in this alternative, compared to Alternative A. However, compared to Alternative B, the catastrophic fire potential is nearly the same (i.e., 7,375 acres likely to burn by implementing Alternative B and 7,870 acres under Alternative C).

## VEGETATION, BIODIVERSITY AND TIMBER

Alternative C has many of the same effects as Alternative B. The primary difference between the two alternatives, in terms of vegetation, timber and biodiversity, is the number of acres being treated. Alternative C will harvest 12,964 MBF from 2548 acres, substantially less than Alternative B (B yields 22,426 MBF from 4657 acres). The differences in effects between Alternative C and Alternative B are discussed below.

### General Overview

**Direct Effects:** The direct effects of implementing Alternative C are the same for the existing plantations as described under Alternative B. In natural stands, however, the short term effects are somewhat different. Selectively thinning the 1,986 acres of natural stands within the project area would result in a harvest of approximately 6.0 MBF per acre of sawtimber (11,840 MBF for the project area) and approximately 16.1 tons per acre of biomass (31,895 total tons for the project area).

All other direct effects within natural stands are the same as those identified in Alternative B, except that no shaded fuelbreaks will be constructed in Alternative C.

**Indirect Effects:** Indirect effects upon the natural stands and plantations are the same as described in Alternative B, except there are no shaded fuelbreaks in Alternative C.

**Cumulative Effects:** The cumulative effects of Alternative C are the same as described for Alternative B.

### Vegetation Strata (Size Class and Density)

**Direct Effects:** The only difference in effects on vegetation strata from implementing Alternative C rather than B is a decrease in the amount of proposed harvest within size class 3, resulting in a change in size class 3 to size class 4 on 1,070 acres (886 acres less than in Alternative B). All other direct effects are the same as in Alternative B.



**Indirect and Cumulative Effects:** Indirect and cumulative effects on vegetation strata in Alternative C are the same as those identified in Alternative B.

### **Species Composition**

The direct, indirect and cumulative effects to species composition are the same in Alternative C as those described in Alternative B.

### **Tree/Stand Age**

The direct, indirect and cumulative effects to tree/stand age are the same in Alternative C as those described in Alternative B.

### **Stand Density**

The direct, indirect and cumulative effects to stand density are the same as those described in Alternative B.

### **Late Seral Forests**

**Direct Effects:** Direct effects to late seral forests in Alternative C are nearly the same as those described in Alternative B. An estimated 276 acres of 4N,G stands will be harvested in Alternative C, including 141 acres located within PACs (no harvesting occurs in PACs in Alternative B). This compares with 261 acres of 4N,G stands proposed for harvest in Alternative B. The retention of at least 40% crown closure will assure that these stands retain their late seral attributes of size and crown closure.

**Indirect Effects:** Long term effects will occur as described in Alternative B, but will be minor. Prescriptions are intended to perpetuate the large tree element characteristic of late seral forests. Treated stands will be more open and parklike in the long term. Both treated and untreated stands will continue their development towards maturity.

**Cumulative Effects:** These effects are the same as those described for Alternative B.

### **Fragmentation of Late Seral Forests**

**Direct Effects:** Direct effects will not occur because all 276 acres of 4N,G stands proposed for harvest will retain the large tree element and at least 40% crown closure.

**Indirect and Cumulative Effects:** These effects will be the same as in Alternative B.

### **Late Seral Connectivity**

The direct, indirect and cumulative effects to late seral connectivity are the same as those described in Alternative B.

### **Lava Caps**

The direct, indirect and cumulative effects to lava caps are the same as those described in Alternative B.

### **Rust Resistant Sugar Pine**

The direct, indirect and cumulative effects to rust resistant sugar pine are the same as those described in Alternative B.

### **Oak Woodlands**

The direct, indirect and cumulative effects to oak woodlands are the same as those described in Alternative B.

### **Riparian Areas**

The direct, indirect and cumulative effects to riparian areas are the same as those described in Alternative B.

## **SENSITIVE PLANTS**

The effects of Alternative C on sensitive plants are expected to be similar to those described for Alternative B, with the exception that there are reduced risks to individual plants, as only four sensitive plant occurrences are in or adjacent to proposed harvest units (as opposed to 11 in Alternative B).

## **FISH AND WILDLIFE**

The results of implementing Alternative C will be similar to Alternative B, with the exception of adaptive management harvest activities in Alternative C on 141 acres within three PACs. Prescribed burning proposed throughout the project area will aid in the regeneration of brushfields and oaks; this burning will occur on 5,623 acres (680 acres less than B). Snags and down log levels will decrease due to fire line construction and incidental loss through burning. The purpose of adaptive management actions in the PACs would be to take pro-active steps to protect the spotted owl from wildfire, rather than

rely on fire suppression alone for protection. Harvesting in the PACs would remove the undesirable fuel ladder now, rather than attempting to remove it with prescribed fire over several entries and decades. This will ensure resilience to fire within owl habitat at a more rapid rate than would occur without a pre-burn harvest.

For a more detailed description of the potential effects to wildlife, see the Biological Evaluation and the Management Indicator Species Analysis in Appendix B.

**Direct Effects:** Harvest operations in the PACs would focus on removing ladder fuels by thinning overgrown thickets within the PAC boundaries. The thinning and subsequent understory burning would reduce the risk of a stand-replacing fire destroying the PAC, decreasing the fire hazard that has accumulated over the past 80 years. There would be an increased risk of disturbance to spotted owls under Alternative C through the harvest entry into PACs. These effects will be minimal and will be controlled by project design, such as limited operating periods and road closures. The remainder of the potential direct effects are identical to those in Alternative B.

**Indirect Effects:** Indirect effects are the same as those identified in Alternative B, with the exception that the beneficial effects resulting from prescribed burning would occur on 680 fewer acres of land. There would also be less of a risk of a prescribed burn escaping if ladder fuels were removed prior to the burning; this occurs on 3,075 fewer acres in Alternative C than in Alternative B. Overstory trees, large snags, and down logs would also be afforded greater protection. The remaining indirect effects are the same as those described in Alternative B.

**Cumulative Effects:** The pre-burn thinning within 141 acres of PACs would provide some additional resilience to catastrophic fire within the treated PACs over that afforded in Alternative B. This short term benefit would be offset, however, by the lack of pre-burn thinning on more than 3,000 acres in Alternative C. The additional burn cycles that would be needed under this alternative to reduce the fuels on these 3,000 acres would leave a larger portion of the project area at a higher risk for catastrophic fire for a longer period of time (28 years as opposed to 7 years with a pre-burn thinning). This extended fire risk would, overall, present a greater long term threat to wildlife over a larger portion of the project area than would be afforded if a pre-burn harvest occurred. The remaining cumulative effects are the same as those described in Alternative B.

## SNAGS AND DOWN LOGS

**Direct Effects:** Direct effects upon snags and down logs vary slightly from Alternative B, with the primary difference the removal of fewer hazard trees adjacent to haul roads in Alternative C. Under this alternative, 22 miles of road would be treated (8 miles less than in B) and approximately 3,300 snags would be felled along the road system (1,200 less than in B), representing a reduction of approximately 1.7 snags per acre.



An average of an additional 0.3 snags per acre (roughly 596 total; 3,404 less than in B) within the harvest area would be felled and removed to meet fuel and safety concerns. The felling of a total of 3,900 snags would represent a reduction of an estimated 3.4% of the snags within the project area (8,500 snags would be taken in Alternative B, for a reduction of 8% of the snags in the project area). After harvest, snags would average approximately 8.0 per acre, with a basal area of approximately 15.2 ft<sup>2</sup>/acre (1.9 ft<sup>2</sup>/tree). The remaining direct effects on snags and down logs are identical to those previously described in Alternative B.

**Indirect and Cumulative Effects:** Indirect and cumulative effects on snags and down logs are the same as those described in Alternative B.

## FIRE AND FUELS

Compared to Alternative B, about 50% less acreage is harvested and about 11% less acreage prescribed burned under this alternative.

**Direct Effects:** Under Alternative C, 5,623 acres of land will have fuels reduced considerably from current amounts (680 acres less than in Alternative B). This represents 39% of the total Forest Service ownership within the project area. No shaded fuelbreaks will be constructed. The felling of hazard trees along 22 miles of roads (8 miles less than in B) will make fire suppression and burning operations safer when these roads are used for firelines. Approximately 31,895 tons of biomass will be removed from harvest areas (35,225 less than in Alternative B). If this biomass were to burn in a wildfire, it would be equivalent to the smoke and energy released in all the woodstoves and fireplaces in the Pollock Pines area for a period of nearly 4 years and 6 months.

The remainder of the direct effects are the same as those identified for Alternative B.

**Indirect Effects:** Implementation of this alternative would require prescribed burning approximately 800 acres per year during the burning cycle. Alternative C will significantly reduce the fire hazard on approximately 5,623 acres (680 acres less than B), including 141 acres inside of three PACs; thus the probability of a large stand-replacing wildfire will be reduced, and greater protection will be afforded within the PACs. However, since 3,075 acres are scheduled for burning without a pre-burn harvest entry, additional burn entries over a longer period of time would be required to reduce the fuels on areas where fire is used alone. These additional burn entries, needed to completely consume the fuels, would increase the potential for fire escapes during prescribed burning in these higher fuel load areas. The lack of fuelbreaks in Alternative C also hampers the success of the burn program somewhat, since fuelbreaks can be used as safe anchor points during the prescribed burning.

Since the probability of a large fire is reduced in this alternative, the risk to and from private residences is also somewhat reduced. This benefit is offset somewhat by the

difficulties of prescribed burning over 3,000 acres without a pre-burn biomass harvest entry to reduce ladder fuels prior to burning, and by the lack of fuelbreaks in this alternative. Due to the location of project activities, private residences would have increased protection from wildland fires originating above and to the north of their location. Protection from fires starting in the canyon below or to the south of the residences would remain the same. Increased protection to public lands from fires originating from within the developed areas would be realized to the north and upslope of the developments, while areas downslope and to the south would remain unchanged.

Other indirect effects are identical to those described for Alternative B.

**Cumulative Effects:** Somewhat less of the project area will have fuels treatment under Alternative C compared to Alternative B; thus the cumulative effects would be the perpetuation of undesirable fire hazards over a larger portion of the landscape than presented in Alternative B. Additionally, the extended number of burn cycles needed to reduce fuels through burning in unthinned stands to the same level achieved in Alternative B (21-28 years compared to 7 years in Alternative B) would leave more of the project area at higher fire risks for an extended period of time. The remainder of the cumulative effects are identical to those indicated in Alternative B.

## AIR QUALITY

**Direct Effects:** Direct effects of implementing Alternative C are slightly less than those described in Alternative B. Alternative C proposes prescribed burning which will result in emissions of approximately 2,200 tons of PM 10 (compared to 2,600 tons in Alternative B), spread over a total of 350 days during a 7 year period. Prescribed burning will reduce the fire hazard on approximately 800 acres annually for the first 7 years, and will produce 314 tons of PM 10 per year during the 50 days of burning per year. The remaining direct effects are identical to those identified in Alternative B.

**Indirect Effects:** With treatment, the largest probable catastrophic wildfire would likely be around 7,870 acres. Emissions from this potential fire would be 6,218 tons of PM 10, most likely spread over a 10 day period; this is 7% more PM 10 than would occur from a large wildfire under Alternative B. All other indirect effects are the same as those described in Alternative B.

**Cumulative Effects:** Cumulative effects from this alternative are the same as in Alternative B.

## VISUAL RESOURCES

Alternative E will have the same direct, indirect and cumulative effects on visual resources as those described previously for Alternative B.

## TRANSPORTATION

**Direct Effects:** There would be approximately one mile of new construction road, 19.2 miles of reconstruction road and 54.9 miles of maintenance road under Alternative C. Comparatively, these are 0.7 fewer new road miles, 10.1 fewer reconstruction road miles, and 4.6 more road maintenance miles than in Alternative B. All other direct effects are the same as in Alternative B.

**Indirect and Cumulative Effects:** Indirect and cumulative effects will be the same on the transportation system as identified in Alternative B.

## RANGE

Direct, indirect and cumulative effects for range will be the same in Alternative C as identified for Alternative B.

## RECREATION

Direct, indirect and cumulative effects for recreation will be the same in Alternative C as identified for Alternative B.

## CULTURAL RESOURCES

The potential consequences to cultural resources from implementing Alternative C are less than those identified in Alternative B. Thirty-five sites (3 less than in Alternative B) are situated in proposed activity areas in Alternative C; 23 of these are prehistoric, 8 are historic and 4 have mixed historic and prehistoric components. A total of 430 acres where ground-disturbing activities are proposed remain unsurveyed in this alternative (115 more unsurveyed acres than in B). One-half mile of road needs archaeological survey prior to the initiation of road work. However, since 92% of the Alternative C project area has been surveyed, the effects of implementing this alternative can be confidently assessed. Unsurveyed ground will be spot-checked prior to all ground-disturbing activities to further confirm the predictions regarding resources of interest as defined in Chapter III, and to further refine the Forest's inventory strategies. If new archaeological sites are discovered, they will be protected by flag-and-avoid measures as outlined in the Memorandum of Understanding between the Eldorado National Forest and the California State Office of Historic Preservation. All the remaining potential effects are the same as those previously described in Alternative B.



## HISTORICAL LANDSCAPE

The direct, indirect and cumulative effects on the historical landscape in Alternative C are only slightly different from those described for Alternative B. Implementing Alternative C will have fairly substantial effects on the historical landscape, as the widespread prescribed burning will facilitate movement toward the Historical Landscape/Desired Condition, although on 680 fewer acres than in Alternative B. However, 3,075 of the acres to be burned are scheduled for prescribed burning without a pre-burn harvest. This will substantially slow the process of reaching the desired condition, as additional burn entries would be needed to successfully remove all the undesired fuels. By implementing Alternative C, however, 141 acres within PACs will move toward the desired condition more quickly in this alternative than in Alternative B. The remaining effects are the same as those described in Alternative B.

## SOCIOECONOMICS

There would be *less volume* removed under Alternative C than Alternative B. This reduced volume results in rather large economic differences, displayed previously in Table 26 and discussed below.

**Direct Effects:** Implementing Alternative C would sanction the continued expenditure of funds for the preparation, administration and maintenance of forest health activities. The total cost of proceeding with this alternative is estimated to be \$2,471,704. Total receipts to the treasury are expected to approach \$2,292,000, while receipts to the county would be an additional \$763,875. An estimated 101 full-time, year-round jobs would result from this alternative. The sale of 12,964 MBF of timber represents about 9% of one year's mill capacity for the largest mill in the county and about 27% of mill capacity for one of the smaller mills in the county.

**Indirect Effects:** Indirect employment created by this alternative is estimated at 65 full-time, year-round jobs.

The reduction in the costs of fire suppression associated with the proposed fuels reduction on 5,623 acres is substantial. District wildland fire experts project that because of fuels treatment, the largest probable catastrophic wildfire would not exceed an estimated 7,870 acres. This is a 10,068 acre reduction in potential catastrophic burn acreage when compared to the No Action Alternative. At a suppression cost of \$1,000/acre, a potential savings of nearly \$10,068,000 in future fire fighting costs is estimated under this alternative. In addition, the reduction in fire size would offer substantial savings to the timber resource within the project area. With an estimated reduction in the loss of future timber values of \$10,000 per acre, there would be a total savings of about \$100,680,000 to the timber resource.

All other indirect effects in this alternative are the same as those described in Alternative B.

**Cumulative Effects:** The cumulative effects for this alternative are the same as for Alternative B.

## SUMMARY DISCUSSION OF ALTERNATIVE C

Alternative C addresses the various issues by treating an area sufficiently large as to reduce the risk of a large stand-replacing fire and to a lesser extent insect epidemics; by offering increased protection to and from private residences from fire; by enhancing plant habitat on the lava cap through prescribed burning; by balancing the wildlife benefits from high levels of snags with the human safety risks created by their presence; by improving late seral habitat conditions through increased growth rates of selected residual trees; by affording added protection from wildfire to spotted owl habitat; and by enhancing wildlife habitat conditions, particularly for the Pacific Deer Herd. Alternative C is further designed to maintain air quality and scenic visual qualities, and to avoid adverse impacts to cultural resources, sensitive plants and owl habitat, while providing an economically feasible means of reaching the desired condition in the project area. The level to which each issue is addressed is discussed in Chapter II.

Alternative C proposes prescribed burning of nearly as many acres as Alternative B, but harvest would be confined to about 2,548 acres (slightly more than half the acres harvested in Alternative B). Watershed effects are reduced by decreased harvest. However, two watersheds would still exceed their TOC (Riverton in 1995-1998 and 2000; Jaybird in 2000-2004). The effects upon vegetation, biodiversity and timber are the same as those described for Alternative B, except on a much smaller scale. This alternative has similarly low impacts to the soil resource.

There are three fewer cultural resource sites located in or adjacent to proposed harvest units in this alternative than Alternative B, reducing somewhat the risk of impact to cultural resources. Only four sensitive plant sites are located within the boundaries of proposed harvest units, thus the potential risk to sensitive plant sites from harvest operations is substantially less than in Alternative B. Flag-and-avoid measures will be used to protect both resources.

This alternative would remove 12,964 MBF of timber with a value of \$3,055,000. Of this amount, approximately \$764,000 would be returned to the counties. These values are about half of those associated with Alternative B. The number of acres potentially subject to catastrophic fire is estimated at 7,900 under this alternative (7,375 acres in Alternative B). Suppression cost savings on the 10,000 acres no longer susceptible to catastrophic burning due to project activities would be about \$10,068,000 (\$10,600,000 in Alternative B) and savings due to a decrease in foregone timber growth would be about \$100,680,000 (compared to \$106,000,000 in Alternative B).

Since wildlife habitat improvement is emphasized in selecting areas for treatment under this alternative, the short term benefits for wildlife are somewhat greater in some areas

than in Alternative B. Many of the PACs contain dense thickets of small diameter trees. These areas provide little to no value to spotted owls while greatly increasing the risk of stand-replacing fires. One hundred forty-one acres of these stands would be thinned and prescribed burned to reduce the fire risk and to increase the growth rate of remaining trees. However, the likelihood of being able to successfully burn the additional 3,075 acres without a pre-burn harvest is a concern under this alternative. The additional burn cycles that would be needed to reduce the fuels on these 3,075 acres would leave a larger portion of the project area at a high risk for catastrophic fire for a longer period of time (28 years, as opposed to 7 years with pre-burn thinning). This extended fire risk would, overall, present an extended threat to wildlife over a larger portion of the project area than would be afforded with pre-burn harvesting.

Although there are nearly 700 fewer acres to be prescribed burned under Alternative C than Alternative B, the fact that most of the prescribed burning under Alternative C occurs without a biomass harvest actually increases the adverse effects upon air quality on a per-acre-burned basis. The net effect on air quality is roughly the same as in Alternative B.

This alternative would aid in achieving the desired condition in the Whale Rock project area, similarly to Alternative B, with slightly decreased resource impacts. However, the probability of successfully burning the acreage goals in this alternative is much lower. The absence of a pre-burn harvest on many of the acres increases the number of burn cycles required to reduce the fuel loading to the desired level, extending the time needed to reach the desired condition.



## ALTERNATIVE D: TIMBER MANAGEMENT EMPHASIS

This alternative proposes thinning of all existing older plantations and selected natural stands for timber management purposes. The emphasis of this alternative is the intensive management of capable, available and suitable lands for timber production. Project activities would include commercial thinning of 562 acres of existing plantations (1,124 MBF) and 962 acres of overstocked, pole-sized natural stands (5,291 MBF). Biomass would be removed on all acres harvested. Total quantities of sawtimber and biomass to be removed are estimated at 6,415 MBF and 17,240 tons, respectively. Prescribed burning on 1,284 harvested and 241 non-harvest acres is proposed as a post-sale activity. Machine piling would occur on 240 acres, with the piles subsequently burned. No fuelbreaks are proposed. This alternative is described in detail in Chapter II.

The direct, indirect, and cumulative effects of implementing this alternative are addressed below by resource area.

### GEOLOGY AND SOILS

This alternative will impact the lowest number of acres of all the alternatives (aside from No Action) and will therefore have fewer short term effects on geology and soils than the other action alternatives. The types of effects from this alternative are essentially the same as those described previously for Alternative B, except as described below.

**Direct Effects:** There are 1.6 miles of new road planned for construction in this alternative (0.1 mile less than in Alternative B). Although this represents slightly less soil loss, compaction and loss of soil productivity than indicated in Alternative B, the difference is insignificant. The 3,133 fewer acres harvested in Alternative D represent a substantial reduction of potential effects to geology and soils as compared to Alternative B. Other direct effects are the same as those addressed in Alternative B.

**Indirect Effects:** Indirect effects of implementing Alternative D are the same as those identified in Alternative B.

**Cumulative Effects:** There should be very little net increase in soil loss or decrease in soil productivity resulting from implementation of Alternative D or any foreseeable future activities in the Whale Rock area. Positive results to geology and soils brought about by activities in Alternative D should outweigh, at least to some degree, any negative cumulative effects by reducing the risk of catastrophic wildfire and thus the risk of cumulative adverse impacts to soils and geological resources. However, these positive benefits are less extensive in this alternative than in any of the others. All other cumulative effects are the same as those described in Alternative B.

## HYDROLOGY

Alternative D produces the same types of hydrologic effects as Alternative B, although these will be substantially less and smaller in scope. The primary difference between the two alternatives is the harvesting of 3,133 fewer acres and prescribed burning of 4,538 fewer acres in Alternative D. In addition, nearly 800 fewer acres are machine piled under this alternative than Alternative B. The miles of new road construction are essentially the same. The differences in effects between Alternative D and Alternative B are summarized below.

**Direct Effects:** The magnitude of direct effects is expected to be less under this alternative than Alternative B, since substantially less acreage is being treated through harvesting or prescribed burning. Still, direct effects to water can be expected as a result of logging near hydrologically sensitive areas, reducing ground cover through prescribed burning or road construction, and from road construction or reconstruction at stream crossings, as described in Alternative B. Harvest areas within Soldier Creek Watershed contain three Class III streamcourses (eight less than in Alternative B). Three Class III streams are located in harvest areas within Pacific House (two less than in B); two in Jaybird (one less than in B); four in Round Tent (two less than in B); and nine in Riverton Watershed (compared to 14 in B). No Class III streamcourses are within harvest areas in Lower Silver or Sunset Watershed (two are included in Sunset in Alternative B). Beneficial uses of water will be adequately protected by LRMP requirements for each of these Class III streams (through a 100-foot equipment exclusion zone) since these particular areas have low drainage densities (except as specified below for Riverton and Round Tent), and the harvest areas containing the streams are located high on slopes away from most beneficial users. Any sedimentation that may occur in these areas will likely be filtered out prior to reaching the main stem in each watershed.

Some of the same concerns exist within Riverton and Round Tent Watersheds as described in Alternative B. Within Riverton, many of the streamcourses of concern in Alternative B are also encompassed by harvest areas in Alternative D. However, there is a lower level of concern since the harvesting in this alternative occurs within patches, as opposed to the continuous areas of harvest planned in Alternative B. The same concerns exist for T11N R13E, Section 25, and the same expanded streamcourse protections will be used in this area as described in Alternative B. Harvest areas in Round Tent Watershed contain four Class III streamcourses. These harvest areas are situated in sensitive areas similar to those in Alternative B, and the same expanded streamcourse protections will be used for T11N R13E, Section 12. Given these requirements there will be a very low potential for direct impacts to water quality.

Proposed new road construction consists of 1.6 miles spread over four watersheds (Appendix G). Direct effects from road construction are expected to be minimal in Lower Silver, Sunset and Jaybird since there are no new stream crossings. The same stream crossings will occur in Round Tent and Pacific House Watersheds as described in Alternative B, with the same effects and suggested protective measures applicable.

Road reconstruction will improve the control of road surface runoff and correct some of the current sedimentation problems associated with the existing road system.

The watershed restoration work described in Alternative B also applies here. Identified projects address existing compaction problems and sedimentation impacts and serve to stabilize sites of active erosion or stream sedimentation, thereby improving watershed conditions.

**Indirect Effects:** Indirect effects are basically the same as described in Alternative B, but should be slightly reduced given the additional edge effect obtained through the more patchlike harvest.

**Cumulative Effects:** The results of the CWE analysis for Alternative D are displayed in the following table:

<b>Table 30. Alternative D Cumulative Watershed Effects</b>								
Watershed	Established TOC(%)	%ERA - Present/Projected						
		1995 (present)	1998	1999	2000	2001	2002	2003
Pacific House	10-12	5.1	5.2	5.1	5.1	5.2	5.0	5.0
Soldier Creek	12-14	12.4	11.3	11.1	11.2	10.7	10.4	10.2
Riverton	10-12	12.9	10.6	10.1	9.7	9.4	8.9	8.6
Lower Silver	10-12	7.0	6.9	6.7	6.7	6.5	6.4	6.4
Round Tent	12-14	7.3	6.8	8.6	8.5	8.5	9.6	9.1
Sunset	10-12	8.7	8.5	8.3	8.7	8.2	7.9	7.3
Jaybird	14-16	8.2	10.5	10.7	11.2	10.2	10.0	9.8

Review of the above table indicates that currently, Soldier Creek and Riverton Watersheds are at or above the established TOC. No additional watersheds would be sufficiently affected as to cause an ERA increase over the TOC. Refer to the CWE Reports and the CWE Supplements for each watershed (available in the planning record for the Whale Rock project) for additional discussion of risks associated with predicted ERAs. Appendix G contains a complete disclosure of all proposed activities by watershed. The following summarizes the differences in CWEs between Alternative D and Alternative B by watershed:

**Riverton Watershed:** Implementing this alternative results in harvest of about 2% less of the total watershed acreage than in Alternative B (220 acres compared to 361 in B). Prescribed burning will result on about 2% (259 acres) of the total watershed acreage, a 5% decrease over Alternative B. Implementation of this alternative would not increase the predicted %ERA above the current percentage. This watershed would recover to a level of disturbance below threshold by the year 2000, as in Alternative B. It should be noted, however, that while this recovery reduces the risk of adverse CWE from an extreme level, the watershed will still remain at a disturbance level considered to be high risk



until roughly 2005 (the same as No Action). Implementation of Alternative D, along with selected BMPs, special mitigation measures, watershed restoration plans, and other Forest Standards and Guidelines, will insure that downstream beneficial uses of water will be adequately protected. Alternative D will not increase the potential for continued adverse CWE within the Riverton Watershed, and the watershed will continue to recover to disturbance levels lower than those that presently exist.

Soldier Creek Watershed: Implementing this alternative results in harvest of about 6% (212 acres) of the total watershed acreage, a decrease from Alternative B of 645 acres or 18%. Prescribed burning will occur on 6% (200 acres) of the total watershed acreage, a 21% decrease (or 744 acres less) than in Alternative B. This watershed would recover to a disturbance level below threshold during 1998 (4 years sooner than in Alternative B) and would remain there throughout implementation of this alternative. Alternative D will not increase the potential for continued adverse CWE within the Soldier Creek Watershed and disturbance levels will continue to decline from existing levels.

Round Tent Canyon: Alternative D results in harvest of about 13% (313 acres) of the total watershed area, a reduction from Alternative B of 843 acres or 35%. Prescribed burning will occur on 14% (337 acres; a decrease from Alternative B of 41%) of the total watershed acreage. Round Tent Watershed remains below threshold levels of disturbance throughout and following activities proposed in Alternative D. At all times, the watershed should be considered to be in a moderate risk class, with disturbance levels between 50-80% of TOC. Alternative D will not increase the risk for adverse CWE within the Round Tent Watershed above the moderate risk level that presently exists. This is the only action alternative that will not cause an increase.

Jaybird Watershed: Alternative D results in harvest of about 20% (330 acres) of the total watershed area, a reduction from Alternative B of 586 acres or 35%. Prescribed burning will occur on 17% (279 acres) of the total watershed acreage, a 17% reduction. The implementation of Alternative D will slightly increase the potential for adverse CWE within the Jaybird Watershed, although the watershed would have disturbance levels that remain below TOC. In the year 2000, disturbance levels would be at the maximum level and only for that year would CWE risk levels be considered high, since the watershed would be within 80% of the TOC.

Lower Silver, Sunset and Pacific House Watersheds: The cumulative effects of Alternative D on all three watersheds are identical to those effects described previously for Alternative B.

Lower South Fork American River Basin: Conclusions regarding basin condition are the same as described in the No Action Alternative (A). There will be no change as a result of implementation of this alternative.

It should be noted that a catastrophic wildfire burning acreage similar to that treated under this alternative would cause watershed effects that are considerably more severe and of longer duration than the effects portrayed by management activities under this alternative.

## **VEGETATION, BIODIVERSITY AND TIMBER**

Alternative D has many of the same types of effects as Alternative B. The key difference between the two in terms of the vegetation, timber and biodiversity consequences is the number of acres being treated, with 3,133 fewer acres subject to harvest and 4,538 fewer acres prescribed burned in Alternative D. In addition, Alternative D has no shaded fuelbreaks constructed. The differences in effects on vegetation, biodiversity and timber between Alternative D and Alternative B are discussed below.

### **General Overview**

**Direct Effects:** The direct effects of implementing Alternative D are the same for the existing plantations as described under Alternative B. However, the short term direct effects on natural stands (in terms of acres, boardfeet harvested and biomass tonnage) vary. Selectively thinning 962 acres of natural stands within the project area would result in a harvest of approximately 5,291 MBF of sawtimber and approximately 14,430 tons of biomass (total biomass for Alternative D, including the plantations, is 17,240 tons). This differs substantially from Alternative B, which proposes to thin 3,181 acres of natural stands yielding 15,167 MBF of sawtimber; total biomass removed in Alternative B is 67,169 tons.

All other direct effects for natural stands are the same as those defined in Alternative B, except that no shaded fuelbreaks will be constructed in this alternative.

**Indirect Effects:** Indirect effects upon the natural stands and plantations are the same as those described in Alternative B, except that no shaded fuelbreaks will be constructed.

**Cumulative Effects:** The cumulative effects of Alternative D are the same as described for Alternative B.

### **Vegetation Strata (Size Class and Density)**

**Direct Effects:** The only difference to vegetation strata in implementing Alternative D rather than B is a decrease in the amount of proposed harvest within size class strata 3, resulting in a change in size class 3 to size class 4 on 673 acres (1,292 acres less than in Alternative B).

**Indirect and Cumulative Effects:** Indirect and cumulative effects on vegetation strata in Alternative D are the same as those described in Alternative B.

### Species Composition

The direct, indirect and cumulative effects to species composition are the same as those described in Alternative B.

### Tree/Stand Age

The direct, indirect and cumulative effects to tree/stand age in Alternative D are the same as those described in Alternative B.

### Stand Density

The direct, indirect and cumulative effects to stand density in Alternative D are the same as those described in Alternative B.

### Late Seral Forests

**Direct Effects:** Direct, short term effects to late seral forests are substantially less than in Alternative B. An estimated 12 acres of 4N,Q stands will be harvested under Alternative D; this is 249 acres less than in Alternative B. The retention of at least 40% crown closure will assure that these stands retain their late seral attributes of size and crown closure.

**Indirect Effects:** Long term effects will be minor. Prescriptions are intended to perpetuate the large tree element characteristic of late seral forests. Treated stands will be more open and parklike in the long term, and will continue their development towards maturity. The remaining indirect effects are the same as those described in Alternative B.

**Cumulative Effects:** These effects are the same as indicated for Alternative B.

### Fragmentation of Late Seral Forests

**Direct Effects:** Direct effects will not occur because the 12 acres of 4N,Q stands proposed for harvest will retain the large tree element and at least 40% crown closure.

**Indirect Effects:** Long term effects will be minor. The increase in late seral habitat would reduce the amount of fragmentation that is present within the project area. With over 60% of the project area in a late seral condition in 50 years, late seral conditions would tend to be the dominant condition and fragmentation would be associated with the early and mid-seral types.

**Cumulative Effects:** These effects are the same as described in Alternative B.



### **Late Seral Connectivity**

The direct, indirect and cumulative effects to late seral connectivity in Alternative D are the same as those described in Alternative B.

### **Lava Caps**

The direct, indirect and cumulative effects to lava caps in Alternative D are the same as those described in Alternative B.

### **Rust Resistant Sugar Pine**

The direct, indirect and cumulative effects to rust resistant sugar pine in Alternative D are the same as those described in Alternative B.

### **Oak Woodlands**

The direct, indirect and cumulative effects to oak woodlands in Alternative D are the same as those described in Alternative B.

### **Riparian Areas**

The direct, indirect and cumulative effects to riparian areas in Alternative D are the same as those described in Alternative B.

## **SENSITIVE PLANTS**

The potential effects, both negative and positive, of this alternative on sensitive plants are less than those described for Alternative B, as there are only 4 occurrences of sensitive plants inside proposed harvest units (compared to 11 in B). Therefore, the risk of mechanical damage to individual plants is greatly reduced.

## **FISH AND WILDLIFE**

**Direct Effects:** Harvest activities, road construction and reconstruction, and prescribed burning may result in direct disturbance to wildlife species in the area. These effects will be minimized through the use of limited operating periods and avoidance of protected activity centers. The thinning and biomass that is planned will somewhat improve wildlife habitat but will do little to reduce the risk of catastrophic fire. Without extensive prescribed burning, brushfields will continue to age with little regeneration, providing scant value to wildlife. Oak will be protected during harvest activities.

**Indirect Effects:** Actions proposed under Alternative D will do little to improve wildlife habitat. In the stands that are proposed for entry, conditions will improve through biomass, thinning and prescribed burning. However, these stands represent a small percentage of the project area. Overall, habitat conditions would remain the same. The risk of a catastrophic fire destroying all or most of the wildlife habitat within the area would be great. A stand-replacing fire would have an effect on downstream fisheries in the American River and Silver Creek through increased sedimentation. The moderate to low habitat capabilities for the Pacific Deer Herd would remain the same due to lack of treatment in brushfields and pure oak stands.

**Cumulative Effects:** The cumulative effects of Alternative D would be directly linked to the Cleveland Fire. The entire Whale Rock area is in need of habitat improvement for all species occurring in the area. The small percentage of land proposed for treatment would do little to improve habitat conditions. In combination with the lack of suitable habitat for most species in the adjacent Cleveland Fire area, conditions over the southern portion of the Pacific District will remain in the low to moderate habitat capability categories for at least 50 years.

## SNAGS AND DOWN LOGS

**Direct Effects:** Fewer hazard trees would be felled under Alternative D than Alternative B. Under Alternative D, 15 miles of road would be treated and 2,250 snags felled along the road system, representing a reduction of approximately 2.3 snags per acre on harvested lands (under Alternative B, nearly 4,500 snags would be removed along 30 miles of road).

No additional snags within harvest areas would be felled to meet fuels and safety considerations across the treated landscape. The felling of a total of 2,250 snags would represent a reduction of an estimated 2.0% of the snags within the project area (compared to a total of 8,500 snags for a reduction of 8.0% of the total snags in Alternative B). After harvest, snags would average 8.0/acre with a basal area of approximately 15.2 ft<sup>2</sup>/acre (1.9 ft<sup>2</sup>/tree).

The remaining direct effects on snags and down logs are identical to those previously described in Alternative B.

**Indirect and Cumulative Effects:** The indirect and cumulative effects on snags and down logs are the same as those described in Alternative B.

## FIRE AND FUELS

**Direct Effects:** After harvest operations are completed under Alternative D, approximately 1,765 acres will be prescribed burned, 72% less than in Alternative B

(which calls for 6,303 acres of burning). This represents 10% of the total project area. From a fire and fuels management perspective, *this proposal is very similar to past management actions in this area.*

Snag levels will be reduced along 15 miles of roadways under this alternative, making it safer for firefighters to use those roads as control lines and travel routes during suppression efforts. This beneficial effect, however, is less than in all other alternatives, except Alternative A (No Action).

Approximately 17,240 tons of biomass will be removed from the project area under this alternative. If this biomass were to be burned in a forest fire, it would release the smoke and energy equivalent of all the woodstoves and fireplaces in the Pollock Pines area over the next 2 years and 5 months.

**Indirect Effects:** The harvest areas where a reduction in existing fuel loading would occur based on this proposal are small in size (less than 40 acres) and scattered over a large land area. The treated areas would not form a continuous zone of reduced fuel loading that would significantly retard the spread of a wildfire. Approximately 90% of the project area would have no fuels treatment under Alternative D, and would therefore remain in a high fire hazard condition upon completion of the project. Although approximately 4,900 acres would be less likely to burn as a result of treatment (compared to the 17,800 acres which could potentially burn if no actions are taken), the risks of fire from and to private residences under this proposal remain high.

**Cumulative Effects:** Those cumulative effects identified in Alternative B apply equally to this alternative, with the exception that a much larger portion of the landscape retains undesirable fuel loads than in Alternative B. This difference leaves the risk of a large, stand-replacing wildfire at high levels.

## AIR QUALITY

**Direct Effects:** Direct effects from prescribed burning are substantially less under Alternative D than those described for Alternative B. Alternative D proposes prescribed burning which will result in emissions of approximately 720 tons of PM 10 (73% less than for Alternative B). These emissions would be spread over a total of 350 days during a 7 year period. Prescribed burning will reduce the fire hazard on 250 acres per year for the first 7 years and would generate an average of 103 tons of PM 10 per year during the 50 burn days of each year.

With this alternative, the opportunity to reduce the fire hazard will occur on roughly 1,765 acres; however, fuels will continue to increase over the remainder of the land in the project area. The effects of 1,765 acres being treated would not be enough to substantially alter the air quality degradation that would occur from catastrophic wildfires within the project area. The remaining direct effects to air quality are the same as described for Alternative B.



**Indirect Effects:** Due to the relatively small number of prescribed burn acres in Alternative D, the largest probable catastrophic wildfire would be approximately 13,000 acres. Emissions from a wildfire of this size would be nearly 10,600 tons of PM 10, spread over a 10 day period (83% more than under Alternative B). Only Alternative A presents more PM 10 emissions from a possible catastrophic wildfire. The health effects of PM 10 are discussed in Alternative B.

**Cumulative Effects:** The cumulative effects to air quality are the same as those identified for Alternative B.

## **VISUAL RESOURCES**

Alternative D will have the same direct, indirect and cumulative effects on visual resources as those described in Alternative B. In all likelihood, the greatest threat to the viewsheds would come from wildland fire.

## **TRANSPORTATION**

**Direct Effects:** Approximately 1.6 miles of new construction road, 14.9 miles of reconstruction road (8.6 miles of which will be rocked) and 46.6 miles of maintenance road are proposed in Alternative D. Compared to Alternative B, there would be 0.1 miles less new road, 14.4 miles less reconstruction road, and 3.8 less maintenance road in this alternative. Accessibility for fuels treatment and fire suppression would be enhanced due to new road construction and reconstruction, although this benefit would be somewhat less than the other alternatives (except Alternative A). All other direct effects are the same as those identified in Alternative B.

**Indirect and Cumulative Effects:** These effects are the same as those described for Alternative B.

## **RANGE**

Direct, indirect and cumulative effects for range are the same in Alternative D as described in Alternative B.

## **RECREATION**

Direct, indirect and cumulative effects for recreation are the same in Alternative D as described in Alternative B.

## CULTURAL RESOURCES

**Direct Effects:** The potential consequences to cultural resources from implementing Alternative D are less than in Alternative B. Fourteen fewer sites (24 total) are within proposed activity areas in Alternative D (38 are within proposed project areas in Alternative B). Twelve of the Alternative D sites are prehistoric, 9 are historic, and 3 have mixed historic and prehistoric components. Eighty acres where ground-disturbing activities are proposed have not yet been surveyed. One-half mile of road requires survey prior to the initiation of roadwork. However, since more than 95% of the Alternative D project area has been surveyed, the effects of implementing this alternative can be confidently assessed. Unsurveyed ground will be spot-checked prior to all ground-disturbing activities to further confirm the predictions regarding the resources of interest defined in Chapter III, and to further refine the Forest's inventory strategies. If new archaeological sites are discovered, they will be protected by flag-and-avoid measures as outlined in the Memorandum of Understanding between the Eldorado National Forest and the California State Office of Historic Preservation. All other direct effects are the same as those identified in Alternative B.

**Indirect Effects:** This alternative leaves a large portion of the fuel load untreated and thus poses a greater risk of future catastrophic wildfires than all other alternatives except Alternative A (No Action). In areas where wildfires occur, the most significant impacts to cultural resources result from fire suppression activities, particularly by heavy equipment cutting suppression lines. In the adjacent Cleveland Fire area, 20% of the known sites were damaged during suppression efforts. Additional post-fire effects include loss of cultural deposits due to accelerated soil erosion and tree-throw. Other indirect effects are the same as those described for Alternative B.

**Cumulative Effects:** Cumulative effects are the same as in Alternative B, except that 24 (rather than 38) sites are in activity areas.

## HISTORICAL LANDSCAPE

**Direct Effects:** Implementing this alternative will have a fairly minor effect on re-creating the historical landscape, since relatively few acres are treated. Thinning areas will create a more parklike forest and allow trees left standing to reach maturity at a faster rate than if no harvesting were to take place. Burning will help keep the landscape open and encourage the expansion of pine and black oak. These effects are very limited in Alternative D.

**Indirect Effects:** Only small areas will become more resilient to stand-replacing wildfires, and little additional protection will be afforded to areas adjacent to Whale Rock from the spread of fire from the analysis area.

**Cumulative Effects:** Cumulative effects are the same as those described for Alternative B.

## SOCIOECONOMICS

Substantially less volume will be removed under Alternative D than Alternative B, resulting in significant economic differences between the two.

**Direct Effects:** The total cost of proceeding with this alternative is estimated to be about \$1,199,093. Total receipts to the treasury are expected to be about \$1,094,000, while receipts to the county would be an additional \$364,831. An estimated 51 full-time, year-round jobs would result from this alternative. The sale of 6,415 MBF of timber represents about 4% of one year's mill capacity for the largest mill in the county and about 16% of mill capacity for one of the smaller mills in the county.

**Indirect Effects:** Indirect employment created by this alternative is estimated at 32 full-time, year-round jobs.

The decrease in costs of fire suppression associated with fuels reduction on 1,765 acres is relatively small. District wildland fire managers project that this alternative would have some effect upon the incidence of catastrophic fire within the project area. It is expected that there would be about a 4,900 acre reduction in the size of a catastrophic fire when compared to the No Action Alternative (Alternative B resulted in a more than 10,600 acre reduction in potential burn acreage). Under Alternative D, the potential catastrophic burn acreage would still *exceed 13,000 acres* compared to about 7,400 acres in Alternative B. At a suppression cost of \$1,000 per acre, a potential savings of nearly \$4,900,000 in future fire fighting costs is likely in this alternative (Alternative B had a projected savings of \$10,600,000). In addition, the reduction in fire size would offer savings to the timber resource within the project area. With an estimated reduction in the loss of future timber values of \$10,000/acre, there would be a total savings of about \$49,000,000 to the timber resource (Alternative B had a projected savings of \$106,000,000).

All other indirect effects in this alternative are the same as those described in Alternative B.

**Cumulative Effects:** The implementation of the harvesting in this alternative would reduce to some degree the timber supply shortfall brought about by the Eldorado National Forest's lack of sale offerings. The harvesting and planned prescribed burning would reduce the costs of future prescribed burning of adjacent areas. The economic effect of returning receipts to the U.S. Treasury and local county government is further enhanced by the decreased likelihood of expending taxes in the form of fire suppression and resource rehabilitation dollars on these or adjacent lands.

## SUMMARY DISCUSSION OF ALTERNATIVE D

Alternative D addresses the various identified issues by offering increased protection to and from private residences from wildfire (although this is slight); by enhancing plant



habitat, sensitive plant habitat in particular, on the lava cap through prescribed burning; and by enhancing early seral wildlife habitat conditions to a minor degree, particularly for the Pacific Deer Herd. Alternative D is further designed to maintain air quality and scenic visual qualities, and to avoid adverse impacts to cultural resources, sensitive plants and owl habitat. The degree to which the issues are addressed is discussed in Chapter II.

Of the action alternatives, this alternative proposes treatment of the lowest number of acres by timber harvest, prescribed burning, and machine piling activities. Commercial thinning, with secondary biomass removal, is the primary harvest prescription (1,524 total harvest acres). Prescribed burning will take place on 1,765 acres.

Since this alternative proposes the least harvest of all action alternatives, the effects upon the soil resource are similarly reduced. Acreage of soil disturbance by equipment would be about one third of that proposed in Alternative B. Because of the reduced harvest, the cumulative watershed effects are also greatly reduced. Only Riverton and Soldier Creek Watersheds exceed their TOC, primarily as a result of existing disturbance levels.

Since no large blocks of land are harvested, the acreage proposed for prescribed burning is reduced. Units that are harvested, and selected lava caps with existing low fuel loading, are the only acres to be burned. The low level of prescribed burning means that impacts to air quality from the prescribed burning program are minimized. The protection afforded to and from private residences is slight as well.

The harvest of 6,291 MBF would generate \$1,459,325 in timber receipts, of which \$364,000 would go to the local counties. An estimated 83 full-time jobs would be created under this alternative. The scattered nature of the harvest/burn units makes this alternative only marginally effective in reducing the potential presence of catastrophic wildfire. Suppression costs may be reduced to the extent that some acres treated under this alternative are less likely to burn than they would be without treatment.

Although the absence of large blocks of treated land reduces the landscape benefits that would be derived from burning, approximately 4,900 acres would be less likely to burn as a result of treatment under this alternative. The suppression cost savings on this 4,900 acres would be \$4,900,000 (compared to \$10,600,000 in Alternative B). The savings in reduced foregone timber values are estimated at \$49,000,000 (\$106,000,000 in Alternative B).

Alternative D provides some benefits to the Whale Rock area through reduced risk of catastrophic fire, with very little risk of adverse impacts by actions within the alternative. This alternative generates sufficient funds to carry out a program of prescribed burning. However, the fact that the harvest units tend to be scattered reduces the efficiency with which the units can be burned and decreases the efficacy of the burning in terms of achieving the desired condition on a landscape-wide scale.

## **ALTERNATIVE E: MULTI-RESOURCE MANAGEMENT EMPHASIS**

The objective of Alternative E is to integrate various treatments proposed in Alternatives B through D to meet combined fire, wildlife and timber resource goals to manage the ecosystem and improve forest health. Proposed activities include constructing shaded fuelbreaks, thinning plantations and natural stands, and implementing an extensive prescribed burn program to enhance wildlife habitat and reduce the risk of catastrophic fire. This alternative proposes thinning of 1,124 MBF from 562 acres of existing plantations and 12,233 MBF from 2,203 acres of natural stands. Total quantities of sawtimber and biomass to be removed are estimated at 19,492 MBF and 49,565 tons, respectively. Fuels treatment will occur on a total of 4,510 acres, 590 of which would be in non-harvested portions of PACs. Machine piling, with subsequent burning of piles, will occur on 777 acres. Approximately 14.5 miles of shaded fuelbreak will be constructed. Alternative E is described in detail in Chapter II.

The direct, indirect, and cumulative effects of implementing this alternative are addressed below by resource area.

### **GEOLOGY AND SOILS**

The types of effects for this alternative are similar to those described in Alternative B, except as identified below.

**Direct Effects:** Construction of 2.2 miles of new roads are planned in this alternative, 0.5 miles more than in Alternative B. Although this represents slightly more soil loss, compaction and loss of soil productivity than indicated in Alternative B, the difference is insignificant. In addition, 978 fewer acres will be harvested in Alternative E than in Alternative B. Adverse direct effects to the soil resource are projected to be very small in this alternative. Other direct effects are the same as those addressed in Alternative B.

**Indirect Effects:** Indirect effects of implementing Alternative E are the same as those identified in Alternative B.

**Cumulative Effects:** Very little net increase in soil loss or decrease in soil productivity should result from implementation of Alternative E or any foreseeable future activities in the Whale Rock area. By reducing the risk of catastrophic wildfire and thus the risk of cumulative adverse impacts to soils and geological resources, the positive effects to geology and soils brought about by activities in Alternative E should outweigh any negative cumulative effects. However, these positive benefits are less far-reaching than in Alternative B, as fewer acres are being treated.



## HYDROLOGY

From a hydrologic perspective, Alternatives E and B are quite similar. The only difference is that 978 fewer acres are harvested in this alternative (a total of 3,679 acres in Alternative E compared to 4,657 in Alternative B), and 1,793 fewer acres are prescribed burned (4,510 in E and 6,303 in B). The differences in effects between Alternatives E and B are minimal and are summarized below.

**Direct Effects:** As described in Alternative B, direct effects to water can be expected as a result of logging near hydrologically sensitive areas, reducing ground cover through prescribed burning or road construction, and from road construction or reconstruction at stream crossings. Six Class III streamcourses are within harvest areas in Soldier Creek Watershed (five less than in Alternative B); three in Pacific House (two less than in B); four in Jaybird (one more than in B); six in Round Tent (the same as in B); nine in Riverton (compared to 14 in B); two in Lower Silver (two more than in B); and three in Sunset (one more than in B). Overall, nine fewer streamcourses will be affected under Alternative E than Alternative B. Beneficial uses of water will be adequately protected by LRMP requirements for each of these Class III streams, through a 100-foot equipment exclusion zone, since these particular areas have low drainage densities (except as specified below for Riverton and Round Tent), and the harvest areas containing the streams are located high on slopes away from most beneficial users. Any sedimentation that may occur in these areas will likely be filtered out prior to reaching the main stem in each watershed.

As described in Alternative B, some of the same concerns and the same expanded streamcourse protections exist for streams in T11N R13E, Section 25 in Riverton Watershed, and in T11N R13E, Section 25 in Round Tent Watershed. However, there is a lower level of concern since the harvesting in this alternative occurs within patches, as opposed to a continuous areas of harvest planned in Alternative B. Since the expanded streamcourse protection described in Alternative B will also be in place for these streams under this alternative, there will be a very low potential for direct impacts to water quality.

Proposed new road construction consists of 2.2 miles spread over six watersheds (see Appendix G). Direct effects from road construction are expected to be minimal in Lower Silver, Sunset and Jaybird Watersheds, since there are no new stream crossings. The same stream crossings will be used in Round Tent and Pacific House Watersheds as described in Alternative B, with the same effects and suggested protective measures. Road reconstruction will improve control of road surface runoff and correct some of the sedimentation problems associated with the existing road system.

The watershed restoration work described in Alternative B also applies here. Identified projects address existing compaction problems and sedimentation impacts, and serve to stabilize sites of active erosion or stream sedimentation, thereby improving watershed conditions.



**Indirect Effects:** Indirect effects are basically the same in Alternative E as described for Alternative B, although they should be slightly less given the reduced areas treated, as well as the additional edge effect obtained through the more patchlike harvest.

**Cumulative Effects:** The results of the cumulative watershed effects (CWE) analysis for this alternative are displayed in the following table:

<b>Table 31. Alternative E Cumulative Watershed Effects</b>								
Watershed	Established TOC(%)	%ERA - Present/Projected						
		1995 (present)	1998	1999	2000	2001	2002	2003
Pacific House	10-12	5.1	4.9	4.9	5.3	5.3	5.2	5.2
Soldier Creek	12-14	12.4	11.3	12.8	13.4	13.6	13.7	13.4
Riverton	10-12	12.9	10.4	10.0	9.8	9.4	9.1	8.7
Lower Silver	10-12	7.0	6.6	7.0	6.9	6.9	6.7	6.7
Round Tent	12-14	7.3	7.2	10.7	10.8	10.8	11.5	10.9
Sunset	10-12	8.7	9.0	8.8	10.0	9.5	9.0	7.7
Jaybird	14-16	8.2	7.9	11.8	15.3	17.5	14.8	14.3

A review of the above table indicates that Soldier Creek and Riverton Watersheds are currently at or above the established Threshold of Concern (TOC). As a result of the proposed alternative, Soldier Creek would remain over threshold and Jaybird Watershed would exceed the estimated TOC. CWE Reports and the CWE Supplements for each watershed include additional discussion of risks associated with predicted ERAs. Appendix G contains a complete disclosure of all proposed activities by watershed. The following further summarizes the *differences* in the CWEs between Alternative E and Alternative B by watershed. The remaining effects are the same as those outlined in Alternative B.

**Riverton Watershed:** Implementing this alternative results in the harvesting of about 2% (234 acres) and prescribed burning of about 2% (188 acres) of the total watershed acreage, as opposed to 5% (581 acres) harvest and 7% (804 acres) burning in Alternative B. The current high ERA calculated for the Riverton Watershed is primarily a reflection of the effects of the Cleveland Wildfire. The implementation of this alternative would not increase the predicted %ERA above the current percentage. This watershed would recover to a level of disturbance below threshold by the year 2000 with the implementation of Alternative E (as in Alternative B). Implementation of Alternative E, along with selected BMPs, special mitigation measures, watershed restoration plans, and other Forest Standards and Guidelines, will insure that downstream beneficial uses of water will be adequately protected. Alternative E will not increase the potential for continued adverse CWE within the Riverton Watershed, and the watershed will continue to recover to disturbance levels lower than those that presently exist.

Soldier Creek Watershed: Implementing this alternative results in harvest of about 20% (708 acres) of the total watershed acreage, a decrease from Alternative B of 149 acres or 4%. Prescribed burning will occur on 22% (771 acres) of the total watershed acreage, a 5% decrease (173 acres less). The level of disturbance proposed in Alternative E, in addition to the already high levels, will likely contribute to the potential for continued adverse CWE within the Soldier Creek Watershed for the next 10 to 15 years. This watershed will continue to be at an extreme risk level until roughly the year 2008, when the watershed would recover to below threshold levels of disturbance. Note that in the event of a wildfire in the watershed the magnitude of disturbance would be greater and recovery would be expected to be longer (with levels remaining over threshold for 15-20 years).

Round Tent Canyon: Alternative E results in harvest of about 24% (577 acres) of the total watershed area, a reduction from Alternative B of 579 acres or 24%. Prescribed burning will occur on 35% (850 acres; a decrease from Alternative B of 20%) of the total watershed acreage. While Round Tent Watershed remains below threshold levels of disturbance, it should be noted that the high risk level would remain until roughly 2005, when the watershed would recover to a disturbance level that is less than 80% of the TOC.

Jaybird Watershed: Alternative E results in harvest of about 53% (877 acres) of the total watershed area, a reduction from Alternative B of 39 acres or 2%. Prescribed burning will occur on 45% (748 acres) of the total watershed acreage, a 4% reduction from Alternative B. The implementation of Alternative E will be likely to contribute to the potential risks of adverse CWE within the Jaybird Watershed. Disturbance levels exceed the TOC beginning in the year 2000 and continuing until roughly 2005. While the disturbance level that would be associated with this project is lower than that expected with a catastrophic wildfire, this watershed would be expected to recover to below threshold levels of disturbance at about the same rate as from a wildfire (roughly 5 years), although the project disturbance levels may be overstated as described in Appendix G.

Lower Silver, Sunset and Pacific House Watersheds: The cumulative effects of Alternative E on all three watersheds are identical to those effects described previously for Alternative B, except that Sunset will be at threshold for one year (2000). This corresponds to a short term, very high risk for adverse CWE. The implementation of Timber Harvest Plans on private lands in 1995 is expected to bring the watershed to within 90% of TOC prior to implementation of the Whale Rock project. With full implementation of all planned activities, the watershed should recover to a moderate risk level (less than 80% of TOC) by the year 2003.

Lower South Fork American River Basin: Implementation of Alternative E would result in a 3% increase of the basin area considered to be at a high risk for adverse

CWE. This shift would consequently result in a 3% reduction of the total basin area presently considered to be at a moderate risk of adverse CWE.

It should be noted that a catastrophic wildfire burning acreage similar to that treated under this alternative would probably cause watershed effects considerably more severe and of longer duration than the effects portrayed by management activities under this alternative.

## **VEGETATION, BIODIVERSITY AND TIMBER**

The major difference between Alternative E and Alternative B in terms of the effects on vegetation, timber and biodiversity is the number of acres being treated, with 978 fewer acres subject to harvest and 1,793 fewer acres prescribed burned in Alternative E. The shaded fuelbreaks proposed for Alternative B would also be constructed under Alternative E. The differences between Alternative E and Alternative B are discussed below.

### **General Overview**

**Direct Effects:** The direct effects of implementing Alternative E are the same for the existing plantations as described under Alternative B. However, the short term direct effects (in acres harvested, boardfeet harvested and biomass tonnage) vary in the natural stands. Selective thinning of the 2,203 acres of natural stands within the project area would result in a harvest of approximately 12,233 MBF of sawtimber and roughly 49,565 tons of biomass for the project area. Approximately 6,000 MBF of the above volume would be derived from the harvesting of 914 acres of proposed shaded fuelbreak. (Alternative B proposes to harvest 3,181 acres of natural stands for 15,167 MBF and to remove 67,169 tons of biomass.)

All other direct effects within natural stands are the same as those described in Alternative B.

**Indirect Effects:** Indirect effects upon the natural stands and plantations are the same as those identified in Alternative B.

**Cumulative Effects:** The cumulative effects of Alternative E are the same as described for Alternative B.

### **Vegetation Strata (Size Class and Density)**

**Direct Effects:** The difference to vegetation strata in implementing Alternative E rather than B is a decrease in the amount of proposed harvest within size class strata 3. This would result in a shift in size class 3 to size class 4 on 1,545 acres (411 acres less than in Alternative B). Though estimates of percent crown closure after harvest are difficult to



determine, it is expected that canopy closure for most 3N,G stands will decrease one class. In the fuelbreaks the post-harvest canopy closure is expected to be about 35% or a 'P' class. All 4N,G stands will retain at least 40% crown closure, thus they will all be maintained as 4N or 4G stands.

**Indirect and Cumulative Effects:** Indirect and cumulative effects on vegetation strata in Alternative E are the same as those described in Alternative B.

### **Species Composition**

The direct, indirect and cumulative effects to species composition are the same as those described in Alternative B.

### **Tree/Stand Age**

The direct, indirect and cumulative effects to tree/stand age in Alternative E are the same as those described in Alternative B.

### **Stand Density**

The direct, indirect and cumulative effects to stand density are the same in Alternative E as those described in Alternative B.

### **Late Seral Forests**

**Direct Effects:** Direct effects to late seral forests in Alternative E are greater than in Alternative B. In Alternative E, an estimated 363 acres of 4N,G stands will be harvested, compared with an estimated 261 acres in Alternative B. The retention of at least 40% crown closure will assure that these stands retain their late seral attributes of size and crown closure.

**Indirect Effects:** Long term effects will occur as described for Alternative B, but will be minor. Prescriptions are intended to perpetuate the large tree element characteristic of late seral forests. Treated stands will be more open and parklike in the long term, and will continue their development towards maturity.

**Cumulative Effects:** These effects are the same as indicated for Alternative B.

### **Fragmentation of Late Seral Forests**

**Direct Effects:** Direct effects will not occur because all 363 acres of 4N,G stands proposed for harvest will retain the large tree element and at least 40% crown closure.

**Indirect and Cumulative Effects:** These effects will be the same as in Alternative B.

### **Late Seral Connectivity**

The direct, indirect and cumulative effects to late seral connectivity are the same in Alternative E as those described in Alternative B.

### **Lava Caps**

The direct, indirect and cumulative effects to lava caps in Alternative E are the same as those described in Alternative B.

### **Rust Resistant Sugar Pine**

The direct, indirect and cumulative effects to rust resistant sugar pine are the same in Alternative E as those described in Alternative B.

### **Oak Woodlands**

The direct, indirect and cumulative effects to oak woodlands in Alternative E are the same as those described in Alternative B.

### **Riparian Areas**

The direct, indirect and cumulative effects to riparian areas are the same in Alternative E as those described in Alternative B.

## **SENSITIVE PLANTS**

The effects of this alternative on sensitive plants are expected to be similar to those effects described for Alternative B. There is a slightly reduced risk of mechanical damage to individual plants under Alternative E due to the presence of only 10 sensitive plant occurrences (B has 11) in or adjacent to proposed fuel breaks and harvest units.

## **FISH AND WILDLIFE**

For a more detailed description of potential effects to wildlife, see the Biological Evaluation and the Management Indicator Species Analysis in Appendix B.

**Direct and Indirect Effects:** The activities proposed by Alternative E will have the same direct and indirect effects to fish and wildlife as those described for Alternative B.

**Cumulative Effects:** Beneficial cumulative effects are less in Alternative E than proposed in Alternative B, in that 1,793 fewer acres of wildlife habitat improvements will occur. However, Alternative E still represents significant habitat improvements to 4,510 acres. Other cumulative effects are the same as outlined in Alternative B.

## SNAGS AND DOWN LOGS

**Direct Effects:** The direct effects upon snags and down logs vary only slightly from Alternative B, with the primary difference the falling of fewer snags in this alternative. Under Alternative E, 25 miles of road would be treated (5 miles less than in B) and approximately 3,750 snags would be felled along the road system (750 fewer snags than in Alternative B). This represents a reduction of approximately 1.2 snags per acre (compared to 1.0 snag per acre in Alternative B).

An average of an additional 0.8 snags per acre (about 2,500 total) within the harvest area would be felled and removed to meet fuel and safety concerns (compared to 1.0 snag per acre for a total of 4,000 in Alternative B). The falling of a total of 6,250 snags would represent a reduction of an estimated 5.5% of the snags within the project area (compared to an 8.0% reduction and 8,500 total snags in Alternative B). After harvest, snags would average 8.0 per acre with a basal area of approximately 15.2 ft<sup>2</sup>/acre (1.9 ft<sup>2</sup>/tree).

The remaining direct effects on snag numbers are the same as those described in Alternative B.

**Indirect and Cumulative Effects:** These effects are the same for snags and down logs as those described for Alternative B.

## FIRE AND FUELS

**Direct Effects:** The effects of Alternative E on fire and fuels are virtually identical to Alternative B. A total of 4,510 acres will have a substantial fuel reduction through prescribed burning in Alternative E. This represents 31% of the total Forest Service ownership within the project area and lies on four major strategic ridgetops and southern exposures, which are critical to future prescribed burns and wildfire suppression actions. The same shaded fuelbreaks described in Alternative B will be constructed. The felling of hazard trees along 25 miles of roads (compared to 30 miles in Alternative B) will make fire suppression and burning operations safer when these roads are used for firelines. In addition, approximately 49,565 tons of biomass will be removed from harvest areas (67,169 tons will be removed in Alternative B). If this biomass were to burn in a wildfire, it would be equivalent to the smoke and energy released by all the woodstoves and fireplaces in the Pollock Pines area over nearly a 7 year period.

The remaining direct effects are the same as those outlined in Alternative B.



**Indirect Effects:** Implementation of this alternative would require prescribed burning of approximately 644 acres per year during the burning cycle. Alternative E will substantially reduce the fire hazard on approximately 4,510 acres, thus the probability of a large stand-replacing wildfire will be reduced. This effect would have less impact than Alternative B, since a slightly larger portion of the landscape (1,793 acres) would retain undesirable fire hazards.

The proposed activities in this alternative are large enough in scale to reduce the likelihood that a high intensity wildfire would destroy treated stands or adjacent stands. Since the probability of a large fire is reduced in this alternative, the risk to and from private residences is also reduced, in the same manner, but to a lesser degree, than afforded in Alternative B. The remaining indirect effects are identical to those described in Alternative B.

**Cumulative Effects:** Cumulative effects are identical to the ones indicated in Alternative B.

## AIR QUALITY

**Direct Effects:** Direct effects of implementing Alternative E are slightly less than those described for Alternative B. Alternative E proposes prescribed burning which will result in emissions of approximately 1,900 tons of PM 10 (28% less than Alternative B) spread over a total of 350 days during a 7 year period.

Prescribed burning will reduce the fire hazard on approximately 644 acres annually for the first 7 years, and will average 270 tons of PM 10 per year during the 50 days of burning per year. The remaining direct effects are identical to those identified in Alternative B.

**Indirect Effects:** Under Alternative E, the largest probable catastrophic wildfire would likely be around 9,200 acres. Emissions from this would be 7,280 tons of PM 10, spread over a 10 day period; this is 26% more PM 10 than would occur from a large wildfire under Alternative B. The health effects of PM 10 are described in Alternative B.

**Cumulative Effects:** Cumulative effects are the same as in Alternative B.

## VISUAL RESOURCES

The same direct, indirect and cumulative effects to visual resources apply to Alternative E as those described in Alternative B.

## TRANSPORTATION

**Direct Effects:** There would be approximately 2.2 miles of new construction road,

32.1 miles of reconstruction road (including 19.3 miles of rocking) and 48.5 miles of maintenance road under Alternative E. These are 0.5 more new road miles, 2.8 more reconstruction road miles, and 1.9 fewer road maintenance miles than in Alternative B. All other direct effects are the same as in Alternative B.

**Indirect and Cumulative Effects:** These effects on the transportation system will be the same as identified for Alternative B.

## **RANGE**

Direct, indirect and cumulative effects for range will be the same in Alternative E as described in Alternative B.

## **RECREATION**

Direct, indirect and cumulative effects for recreation will be the same in Alternative E as described in Alternative B.

## **CULTURAL RESOURCES**

The potential consequences to cultural resources from implementing this alternative are slightly less than those identified for Alternative B. Two fewer sites (36 total) are within proposed project areas in Alternative E; these include 22 prehistoric sites, 11 historic sites and 3 sites with mixed prehistoric and historic components. All areas where ground-disturbing activities are proposed in Alternative E have been surveyed (compared to 315 unsurveyed acres in Alternative B). In addition, all areas of proposed road work have been surveyed. All the remaining potential effects are the same as those identified in Alternative B.

## **HISTORICAL LANDSCAPE**

The direct, indirect and cumulative effects on the historical landscape in Alternative E are only slightly different than in Alternative B. Although implementing Alternative E will facilitate 4,510 acres moving toward the Historical Landscape/Desired Condition, this is substantially less than indicated for Alternative B (1,793 acres less in Alternative E). The remaining effects are the same as those described for Alternative B.

## **SOCIOECONOMICS**

**Direct Effects:** The total cost of proceeding with this alternative is estimated to be \$2,868,601. Total receipts to the treasury are expected to approach \$3,470,000, while

receipts to the county would be an additional \$1,156,000. An estimated 153 full-time, year-round jobs would result from this alternative. The sale of 19,492 MBF of timber represents about 15% of one year's mill capacity for the largest mill in the county and about 50% of mill capacity for one of the smaller mills in the county.

**Indirect Effects:** Indirect employment created by this alternative is estimated at 97 full-time, year-round jobs.

The decrease in fire suppression costs associated with fuels reduction on 4,510 acres is substantial. Wildland fire experts project that because of fuels treatment, the largest probable catastrophic wildfire would not exceed 9,200 acres. This is approximately an 8,700 acre reduction in potential catastrophic burn acreage when compared to the No Action Alternative (Alternative B has a 10,600 acre reduction). At a suppression cost of \$1,000 per acre, a potential savings of \$8,700,000 in future fire fighting costs is estimated in this alternative, compared to a \$10,600,000 reduction in Alternative B. In addition, decreased fire size would offer substantial savings to the timber resource within the project area. With an estimated reduction in the loss of future timber values of \$10,000 per acre, there would be a total savings of about \$87,000,000 to the timber resource.

All other indirect effects for this alternative are the same as those in Alternative B.

**Cumulative Effects:** All cumulative effects are the same as those described in Alternative B.

## SUMMARY DISCUSSION OF ALTERNATIVE E

Alternative E addresses a number of the identified issues. This was accomplished by treating an area sufficiently large as to reduce the risk of insect epidemics and large stand-replacing fires; by offering increased protection to and from private residences from wildfire; by enhancing plant habitat on the lava cap through prescribed burning; by enhancing old growth wildlife habitat; and by enhancing early seral wildlife habitat conditions, particularly for the Pacific Deer Herd. Alternative E is further designed to balance the wildlife benefits from high levels of snags with the human safety concerns created by their presence; to maintain air quality and scenic visual qualities; and to avoid adverse impacts to cultural resources, sensitive plants and owl habitat, while providing an economically feasible means of reaching the desired condition in the Whale Rock area. The extent to which each issue is addressed is described in Chapter II.

This alternative proposes to harvest acreages that are intermediate in size compared to other alternatives. Approximately 1,000 fewer acres would be treated in this alternative compared to Alternative B. Compared to Alternative C, this alternative proposes harvest acreages that are approximately 1,100 acres larger. Compared to Alternative D, this alternative would harvest 2,100 more acres. The number of acres prescribed burned and the volume of forest products removed follows a similar pattern to the other



alternatives, with this alternative at an intermediate level. The environmental and economic risks and effects of Alternative E are correspondingly intermediate when compared to the other action alternatives.

The proposed activities in this alternative are sufficiently extensive as to reduce the likelihood that a high intensity wildfire would destroy treated stands or adjacent stands. Since the probability of a large fire is reduced, the risk to and from private residences is also reduced, although to a lesser extent than in Alternative B. Alternative E will substantially reduce the fire hazard on approximately 4,510 acres. This effect would be 29% less than in Alternative B, since a larger portion of the landscape would retain undesirable fire hazards.

From a geology and soils perspective, the reduced risk of catastrophic fire presents far greater benefit to these resources than the potential adverse effects of the proposed program of harvest and prescribed burning. The cumulative watershed effects are less in this alternative than in Alternative B because less acreage would be treated. Still, three watersheds would exceed their TOC for approximately 3 to 5 years.

The effects to lava cap plant communities, oak woodlands, sensitive plants, riparian areas, cultural resources, fish and wildlife are quite similar to those described in Alternative B. A common element in all the resource discussions is the recognition that the greatest risk to these resources is presented by catastrophic fire. Since Alternative E reduces the potential catastrophic fire acreage by half, through prescribed burning with pre-harvest thinning, the benefits are consequential. The fuelbreaks aid in securing lowered fire risks on a landscape wide scale.

The socioeconomic effects associated with the proposed harvest of 19,492 MBF of timber are substantial. Alternative E would cost about \$2,868,601 to implement and would generate over \$4,600,000 in receipts, with about \$1,160,000 returned to the affected counties. An estimated 250 year-round jobs would be created or maintained, and \$4,900,000 in total economic activity and \$4,231,000 in personal income would be generated. The decrease in potential catastrophic burn acreage results in an estimated reduction in future suppression costs of \$8,700,000 and the avoidance of \$87,000,000 in foregone timber losses.

Alternative E offers the opportunity to begin to restore nearly one-quarter of the total project area to its historic condition. The desired condition within the Whale Rock area would be met in large measure by implementing this alternative.

## MITIGATION MEASURES COMMON TO ALL ACTION ALTERNATIVES

A number of mitigation measures apply to all action alternatives, including the proposed action. These mitigations are used to minimize, avoid, compensate, reduce or eliminate potential negative effects of proposed activities. Many of these mitigation measures are considered "standard" practices, but are mentioned here for emphasis and clarity. Monitoring of these mitigations and other forest practices will be conducted at various intervals throughout and following project implementation. A summary of the monitoring plan is contained in Appendix J. Monitoring will determine the effectiveness of management activities and validate and improve decision-making for future projects.

1. Any sightings of listed or sensitive wildlife species, or locations of nests or dens of these species, will be reported to the Wildlife Biologist. These nests and/or dens will be protected in accordance with the Forest Plan. Contract provision C6.25#, Protection of Habitat of Endangered Species, would be included in the Timber Sale Contract.
2. A limited operating period (LOP) from March 1 to August 31 will be in effect for all activities within 1/4 mile of known or suspected nest stands for spotted owls and northern goshawks. This mitigation would remove the threat of disturbance to known nesting pairs during the nesting season. For all northern goshawks found nesting in the project area, a 120-acre nest stand will be established to protect the best available habitat in and around the nest grove.
3. If a new pair of California spotted owls or nesting goshawks are located prior to or during project implementation, the LOP will be imposed and the District Wildlife Biologist will be consulted. The biological evaluation will be amended to determine whether or not a PAC should be created. In accordance with the LRMP, a Goshawk Management Area (GMA) will be created for the protection of discovered goshawks.
4. All newly constructed roads will be closed to public access to minimize effects to wildlife and other resources. All unsurfaced system roads within the project area will remain gated and closed to public access during wet-weather periods.
5. All thinning and burning in, or near, PACs and SOHAs will be coordinated with District wildlife biologists to assure that all adverse effects are minimal; this will reduce the likelihood that the project will result in a trend toward Federal listing. If activities are needed such as fireline construction or a burn prescription that would require burning within the limited operating period, a site-specific evaluation will be done by the district biologist at that time. Analysis will depend on time of year, duration of activity and location.

6. Should snags fall below desired levels for wildlife needs, snag recruitment will be utilized as necessary to replace incidental losses.
7. All known sensitive plant occurrences within the proposed project area will be designated as Controlled Areas on project maps and by the use of flagging. Maps providing detailed locations of these Controlled Areas are on file in the Forest Sensitive Plant records at the Supervisor's Office and the District office. Additional monitoring and mitigation measures for Pleasant Valley mariposa lily and yellow bur navarretia are included in Appendix E.
8. Any newly discovered sensitive plant occurrences will be reported to the Forest Botanist. These areas will be protected by provision C6.25#, Protection of Habitat of Endangered Species, included in the Timber Sale Contract.
9. Although understory burning in sensitive plant habitat and near occurrences may contribute to an increase in plant numbers, burning near or within sensitive plant habitat will be coordinated with Forest or District botanists in order to minimize potential adverse effects. Dates for the prescribed underburning will be coordinated with a botanist. Fireline construction will be subject to review by a botanist in sensitive plant Controlled Areas. Botanists will field review directional felling, endlining, underburning or mechanical treatment for establishment of the proposed shaded fuelbreak system within Sensitive Plant Controlled Areas.
10. There will be no landing construction or ground based equipment in Controlled Areas. Field review by a botanist will be required for harvest activities planned in Controlled Areas. All subsoiling, ripping, soil stability and erosion control measures within Controlled Areas are to be approved by the Forest botanist prior to implementation.
11. Limited operating periods (December 1 to August 15 for Pleasant Valley mariposa lily; December 1 to July 1 for yellow bur navarretia) will be used when revegetating roads within Controlled Areas. Forest botanists will review and provide input for species mix and methods for road revegetation. All revegetation activities will use only species identified as being endemic to the westside Sierra.
12. Rust-resistant sugar pine trees will be identified and protected.
13. The retention of at least 40% crown closure in treated pockets of late seral forests will assure that these stands retain their late seral attributes of size and crown closure.
14. The application of appropriate Best Management Practices (Appendix A) is expected to reduce nonpoint sources of pollution from sediments to levels compatible with water quality goals.



15. In all watersheds that are at or over the threshold of concern (TOC) at project completion, all portions of landings outside of permanent road beds, all temporary roads and all main skid roads will be subsoiled and waterbarred to increase infiltration rates. Subsoiling of secondary skid trails will not be done because of the propensity to damage root systems on these narrower trails. In addition, all timber sale contracts will require that all landings be grass-seeded in order to quickly re-establish ground cover.
16. Watershed Improvement Needs Assessments will be conducted in all watersheds over the TOC. Such assessments will be completed prior to timber sale contract completion. To the extent that funds are available, recommended improvement work will be included in the Sale Area Improvement (SAI) Plan for the appropriate contract. Monitoring of completed SAI work will also be done to the extent that funds are available.
17. To protect water quality, several non-standard mitigation activities will be universally applied, including: a) one-end suspension of all skidded logs and biomass; b) ripping and grass-seeding, by purchaser, of all landings used that are outside the roadbed of permanent roads; c) post-project ripping and grass-seeding of all other Forest Service landings not expected to be used within 5 years, in watersheds that exceed the TOC; and d) post-project ripping, grass-seeding and closure of all Forest Service temporary roads in watersheds that exceed the TOC. Actions planned to mitigate potential risks associated with additional disturbance within the Soldier Creek Watershed include rocking of critical roads for watershed protection; temporary road, skid trail and landing obliteration; and waterhole repair. In addition, the watershed improvement work scheduled on the Black Flag Salvage Sale (described in Chapter II) will improve watershed conditions by reducing channel erosion rates.
18. All new road construction cuts and fills over 2 feet in height will be grass-seeded prior to the first winter after construction. In addition, straw mulch will be spread over cuts and fills to reduce erosion.
19. Contract provision C6.6 (Erosion Prevention and Control) requires installation of erosion control structures within 15 days of completion of skidding operations, unless conditions warrant more immediate action.
20. Existing waterholes will be reconstructed in order to reduce contamination and siltation during use. At minimum, reconstruction would include rocking of all road segments within 200 feet of waterfill location, and construction of berms or other drainage devices to prevent contamination of the water source during periods of use.

21. Streamside Management Zones (SMZs) will be designated along streams and wetlands; prescriptions will minimize the effects of nearby logging and related land disturbance activities. By designating a streamcourse on the sale area map, a minimum 50-foot buffer is contractually established. Class I, II, and III streamcourses will be given larger streamside zone widths (100-foot minimum on each side of the stream, or other as identified on the ground). Minimum requirements may be adjusted in areas where hydrologists or fish biologists determine proposed activities will be beneficial.
22. Landings must meet the following criteria in order to minimize effects to water quality from land-disturbing activities:
  - a. The landing will not exceed the size needed for safe and efficient skidding and loading operations;
  - b. Where reasonable choices exist, landing locations are selected which involve the least amount of excavation and least erosion potential;
  - c. Landings are usually located near the points of ridges so that felled timber between drainages can be skidded to the landing without crossing channels or violating SMZs;
  - d. Landings are located where the least number of skid roads are required;
  - e. If possible, the skid road approach to the landing is nearly level;
  - f. New landings are designed and constructed as part of specified roads;
  - g. Landing size or equipment restrictions, if any, are adhered to.

After landings have served sale needs, the purchaser will ditch, rip or slope the landings to permit drainage, infiltration and dispersion of water. Unless otherwise agreed, cut and fill banks around landings will be sloped to remove overhangs and otherwise minimize erosion. Existing landings not used by the purchaser, but in need of treatment, will be treated by the Forest Service using Sale Area Improvement funds collected from timber stumpage.

23. Although streamcourse crossings are designed to be minimal in this project, they will be protected as outlined in BMP 1.19 and BMP 2.16 (Appendix A).
24. A forest-wide monitoring study has indicated that soil mitigation measures have been effective on the forest, and there is no anticipated decrease in long term soil productivity. Soils will be protected by following LRMP standards and guidelines and Draft Region 5 Soil Quality Standards, and by implementing Best Management Practices (BMPs). The retention of large trees will potentially provide large future snags, assuring that future requirements for large woody material are met. Tractor piling of slash will be limited to periods when soil moisture is low to ensure that adequate soil porosity is maintained. Standard restrictions for wet-weather periods will be followed.

25. Use of existing skid trails and landings will be emphasized to minimize disturbance. Water bars will be constructed on all skid trails after timber harvest to help control erosion. Unnecessary roads will be identified and obliterated.
26. Appropriate Forest specialists will monitor on-going project activities to determine the need for specific site-preparation measures, such as alternative methods of piling in locations with high potential for loss of soil productivity and high erosion rates through soil displacement and compaction.
27. If prescribed burning creates small "hot spots" where mineral soil is exposed, mitigations will include seeding and/or mulching to provide ground cover, if needle cast or resprouting vegetation (such as bear clover) is insufficient.
28. Where increased traffic volumes from log trucks, chip vans and support vehicles might create traffic safety problems, user safety on single lane local roads will be mitigated by signing and traffic control (FSM 7731.15 - Signing and Traffic Control Devices, FSH 7109.31), and by road and public use restrictions (C5.12 - Use of Roads by Purchaser, C5.122 - Road Restrictions, and CT6.33 - Safety).
29. Skid trail layout will be agreed to in advance by the Sale Administrator and the Purchaser.
30. Tractors will use existing skid trail networks whenever appropriate. Logs will be endlined as appropriate to avoid undesirable impacts from skidding.
31. Monitoring during prescribed burning will include documentation of weather and fire behavior (flame height and length, scorch height, rate of spread). Probability of ignition will also be closely monitored for information on potential for spot fires and when to initiate mop-up.
32. Monitoring for excessive smoke inhalation in the primary fireline holding forces during prescribed fire will require visual monitoring, avoidance when possible, and consideration of wind shifts. All local residents will be informed of prescribed burning if smoke will drift toward their residences. All local public roads will be posted that burning is in progress.
33. Monitoring following fuels treatments will follow LRMP guidelines. Effectiveness of fuels treatment will be evaluated using techniques such as photo points, post treatment fuel inventory, transects for soil coverage, or site inspection by the IDT the year following treatment.
34. If prescribed burning results in loss of more than 50 percent of the soil cover remaining on the steep slopes after burning, natural soil cover may be augmented by seeding with native grasses (as recommended and approved by the Forest Botanist) or the application of mulch.



35. Dust abatement will be used to mitigate the increase in fugitive dust and equipment emissions.
36. Contract provision C6.24#, Protection of Cultural Resources, will be included in timber sale contracts. The District Archaeologist will monitor project activities to ensure that avoidance procedures are effective. Periodic inspections will take place when project activities are within 50 meters of archaeological sites. When all project activities are completed, sites will be revisited to ensure that historic properties have not been affected. In addition, the District Archaeologist will be present during all hazard tree removal in the vicinity of of archaeological sites. Hazard trees within or near sites will be felled in accordance with the Memorandum of Understanding (MOU) between the Forest and the California State Office of Historic Preservation. If cultural properties cannot be avoided as prescribed in the MOU, all provisions of 36 CFR 800 regarding evaluating sites as per the National Register of Historic Places will apply.
37. During roadwork operations, cultural resource sites will be protected or mitigated from planned activities.
38. Prescribed burning in the vicinity of the collapsed historic cabin site (FS No. 05-03-55-64) will be coordinated with the District Archaeologist. Fuels in the cabin vicinity will be reduced by hand piling under the archaeologist's direction, with the piles subsequently burned.
39. All proposed harvest, road construction and prescribed burning proposals within 1/4 mile of the portion of the South Fork of the American River deemed eligible for inclusion into the Wild and Scenic Rivers System will be compatible with the guidelines in the Interim Management of Study Rivers (FSH 1909.12, Chapter 8.12). This will ensure that the outstandingly remarkable recreation and historical values present are preserved.
40. Visual quality objectives (VQO) will be retained for all prescriptions throughout the project area.
41. No activities will occur within the Research Natural Area.

Once again, monitoring of these mitigations and other forest practices will be conducted at specified intervals throughout and following project implementation. A summary of the monitoring plan is contained in Appendix J.

## **IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS OF RESOURCES**

An *irreversible* commitment of resources refers to the loss of production or use of a resource due to a land use decision that, once executed, cannot be changed. Nonrenewable resources (e.g., soil, rock resources, minerals, etc.) are an irreversible commitment once used or lost. An *irretrievable* commitment of resources applies to losses of production or use of renewable resources for a period of time. Opportunities are foregone for the period of time that the resource cannot be used.

### **VEGETATION**

The alternatives vary in the degree and timing of achieving the vegetative desired condition. The alternatives that require the longest periods of time to achieve the desired condition also pose the greatest risk of losses to catastrophic fire. Without substantial changes to the vegetation and fuel loadings within the project area, the probability that a stand-replacing wildfire will occur is simply a function of time. Delays in reaching the desired condition may represent an irretrievable loss of time and this loss of time may equate to the irretrievable loss of management options, in terms of vegetation, and ultimately, all other resources.

### **SOILS**

Alternatives B through E all involve varying degrees of soil disturbance with resultant potential accelerated erosion. Although the soil losses are sufficiently small as to be considered environmentally insignificant, a small possibility exists that soil losses would be greater than predicted. Such losses could occur through operations errors or extraordinary storm events. Any losses of soil above the normal or natural level is considered an irreversible loss.

### **WATER**

Land disturbance actions in Alternatives B through E would all increase the potential for direct, indirect and cumulative effects to water quantity and quality. In all cases, the potential effects are expected to be minor and short term. In watersheds where disturbance is considered to exceed threshold levels, the effects have minor impact because of the minimal beneficial uses of water within those areas. The No Action Alternative carries the highest risk of catastrophic fire, and such a fire would cause long term water quality degradation that would require several decades to recover. Alternatives B through E do not prevent catastrophic fire, but reduce the probability of its occurrence. Therefore, although Alternatives B through E reduce the irreversible and irretrievable commitment of resources to catastrophic fire, these alternatives do not eliminate the potential of such commitments.

## **ECONOMICS**

Because differing amounts of timber are harvested under the various alternatives, varying amounts of economic value are realized and foregone. With on-going mortality, those alternatives which propose the least harvest forego the most economic value in terms of receipts produced, employment created and economic activity stimulated. Because much of the available timber will die within a few years from overcrowding or wildfire, postponing harvest or limiting the area harvested will result in economic values that are foregone and irretrievable.

Harvest prescriptions in the alternatives are intended to improve the overall forest health of the project area. Timber growth is an element of forest health, and dense, overstocked timber stands grow slowly. Timber growth lost because of overcrowding cannot be recovered, and this loss of growth is an economic opportunity foregone.

## **ADVERSE EFFECTS THAT CANNOT BE AVOIDED**

The following adverse effects to soils, water, vegetation, wildlife, air quality and fire hazards cannot be avoided.

### **SOILS AND WATER**

Short term sediment production during road construction and timber harvest are unavoidable. Channel morphology would likely be changed in areas where harvest surrounds streamcourses. Best Management Practices are designed to minimize negative impacts.

### **VEGETATION**

Harvest and road construction activities involve removal of trees and brush. In addition to vegetation intentionally removed, incidental damage inevitably occurs to vegetation not intended for removal. Damage to vegetation by equipment during falling, skidding, excavation and loading operations is an unavoidable aspect of harvest and construction activities. Standard contractual clauses common to timber sale and biomass removal contracts would be included to minimize damage. In addition, special contractual provisions, such as maximum log length requirements, limits on equipment sizes and the presale marking of all included sawtimber, would serve to limit the amount of damage.



## **WILDLIFE**

Noise and activity associated with harvest or road construction operations unavoidably cause disturbances to individual animals in the area of activity. Limited Operating Periods would be used to reduce the disturbance to sensitive species, but individual animals of non-sensitive species would be temporarily disturbed. Unintentional disturbance to the nests of small animals would occur and this disturbance is, for the most part, unavoidable.

## **AIR QUALITY**

Air quality would be affected during harvesting by the creation of dust and during prescribed burning by the creation of smoke.

## **FIRE HAZARD**

Although all of the alternatives (with the exception of No Action) are intended to reduce fire hazard, each introduces an element of risk through the use of heavy equipment in locations with an existing high fire hazard. Harvest activities carry with them the risk of operational or negligent fires caused by hot exhausts, electrical problems and smoking. These risks can usually be reduced to low levels through the administration of standard contractual clauses. Harvest operations, while removing fuels that cause longer term fire risks, also increase short term fire hazards from the increase in fine fuels generated during harvest operations. These fine fuels, such as small branches, needles, and crushed brush, are present only for 1 or 2 years before they become compacted or decomposed. Post-harvest prescribed burning, proposed in all the action alternatives, would readily consume this small material. This use of controlled fire, however, also creates the risk of fire escapes. This risk can be reduced by conducting prescribed burns during appropriate weather and fuel conditions using knowledgeable, well-trained and well-equipped personnel.

## **SPECIFICALLY REQUIRED DISCLOSURES**

### **EFFECTS ON MINORITIES AND WOMEN**

Effects on minorities and women would for the most part be unchanged by the implementation of any action alternative. A number of minorities are usually included in the hiring for harvest operations. Effects upon the civil rights of any citizen would be unchanged with the implementation of any alternative.

## **ENERGY REQUIREMENTS OF ALTERNATIVES**

There are no unusual energy requirements for any of the alternatives. The energy required to implement any of the alternatives in terms of petroleum products is insignificant, when viewed in light of production costs and effects on national and worldwide petroleum reserves. The use of ground-based skidding equipment is roughly ten times more energy efficient than helicopter operations per MBF harvested.

## **EFFECTS OF ALTERNATIVES ON PRIME RANGELAND, FOREST LAND AND FARM LAND**

The alternatives presented are in compliance with the Federal Regulations for prime land. The definition of prime forest lands does not apply to lands within National Forests. Federal lands will be managed with the appropriate considerations for adjacent lands.

## **EFFECTS OF ALTERNATIVES ON FLOOD PLAINS AND WETLANDS**

There would be no effect upon flood plains or wetlands. Effects upon riparian areas would be in accord with FSH 2509.22, Forest Plan Standards and Guidelines as well as Executive Orders 11988 and 11990.

## **EFFECTS OF ALTERNATIVES ON THREATENED AND ENDANGERED SPECIES**

Consultations with the U.S. Fish and Wildlife Service, along with Biological Evaluations, indicate that there are no Threatened or Endangered species which would be adversely affected by the alternatives.

## **POTENTIAL CONFLICTS WITH PLANS AND POLICIES OF OTHER JURISDICTIONS**

The environmental analysis did not reveal any potential conflicts with plans or policies of other jurisdictions.

## **CHAPTER V**

### **LIST OF PREPARERS**

#### **INTRODUCTION**

The following is an alphabetical listing of contributors to this report. The list begins with those individuals who were on the Interdisciplinary Team. Individuals who contributed information, assistance or support follow.

#### **INTERDISCIPLINARY TEAM MEMBERS**

##### **Robin Barron**

Team Member, District Botanist. Coauthor, Sensitive Plant Section.

Education: Senior in Biology/Anthropology, with emphasis in Ethnobotany, California State University, Sacramento.

Experience: 8 years  
District Botanist, Pacific Ranger District, Eldorado National Forest, 4 field seasons.  
Volunteer botanist aide, Eldorado National Forest.  
Student botanist aide, Eldorado National Forest.  
Independent botanical consultant.

##### **Krista Deal**

Team Member, District Archaeologist. Co-Team Leader beginning April, 1994. Primary Author, Historical Landscape and Cultural Resource Sections.

Education: M.A., Anthropology, California State University, Chico, 1987.  
B.A., Anthropology, University of Arizona, Tucson, 1978.

Experience: 18 years  
District Archaeologist, Pacific Ranger District, Eldorado National Forest, 6 years.  
Archaeologist, National Park Service (WACC), 3 years.  
Curator of Records, Northeast Information Center, California State Office of Historic Preservation, 4 years.  
Archaeologist, Tahoe and Plumas National Forests, 1 year each.  
Contract Archaeologist, various private firms and state agencies, 3 years.



**(Krista Deal, continued)**

## Other Related

Experience: Intern in Archaeology, Tahoe National Forest and California State University, Chico.  
Instructor, Lab Assistant, Field Supervisor, Crew Chief; California State University, San Bernardino and Chico; University of Arizona; and Pima Community College, Tucson.  
Interdisciplinary Team Member and contributor, various Forest Service projects.

**Don Errington**

Team Member, District Timber Management Officer. Co-Team Leader beginning June, 1994, following Marie Kennedy's departure. Primary author, Timber Sections.

Education: B.S., Forest Resource Management, University of Minnesota, 1967.

Experience: 26 years  
Forester, Timber Management Officer, Pacific Ranger District, Eldorado National Forest, 18 years.  
Forester, Sale Administration/Silviculturist/Timber Management Officer, Hot Springs Ranger District, Sequoia National Forest, 5 years.  
Forester, Mariposa Ranger District, Sierra National Forest, 3 years.

## Other Related

Experience: Range Technician, Sawtooth National Forest, 3 months.  
Primary author/contributor to numerous Environmental Assessments with the Forest Service.

**Charis Genter**

Team Member, Assistant District Wildlife Biologist. Primary Author, Wildlife Sections.

Education: B.S., Wildlife and Fisheries Biology, University of California, Davis, 1991.

Experience: 4 years  
Wildlife Biologist, Pacific Ranger District, Eldorado National Forest, 3 years.  
Wildlife Biologist, Wildlife International, Inc., 4 months.  
Biological Technician, Pacific Ranger District, 5 months.

## Other Related

Experience: Intern, HOWL Wildlife Care Center, Washington, 3 months.

**Marie Kennedy**

Team Member, Assistant Silviculturist. Team Leader August, 1993, to April, 1994. Co-Leader, April 1994 to May 1994. Left team in May, 1994, to relocate out of area.

Education: B.S., Forestry and Resource Management, University of California, Berkeley, 1984.

Experience: 11 years  
Assistant Silviculturist, Pacific Ranger District, Eldorado National Forest, 6 years.  
Forestry Technician, Pacific Ranger District, Eldorado National Forest, 4 years.  
Forester, Champion International Lumber Company, 1 year.

**Other Related**

Experience: Lab Assistant, Department of Forestry, University of California, Berkeley. Duty station at Jackson State Forest, Fort Bragg, California.  
Interdisciplinary Team Member and Contributor, various Forest Service projects.

**Jim Koltun**

Team Member, Engineering and Logging Systems Coordinator. Primary Author, Transportation Section.

Education: Graduate of Forest Engineering Institute, California State University, Humboldt, 1986.  
B.S., Parks and Recreation Administration, California State University, Sacramento, 1984.

Experience: 25 years  
Engineering Survey, Design, Road Location, Transportation Planning, Timber Sale Layout, Logging System Design, Transportation Planner for the Eldorado National Forest.

**Other Related**

Experience: Interdisciplinary Team Member and Contributor, various Forest Service projects.

**Art Mackey**

Team Member, Fuels Specialist. Primary Author, Air Quality Section; Coauthor, Fire/Fuels Sections.

Education: Graduate, Technical Fire Management, Colorado State University, 1992.

Experience: 25 years  
Fuels Management Officer, Pacific Ranger District, Eldorado National Forest, 7 years.

**(Art Mackey, continued)**

Fuels Foreman and Assistant Fuels Officer, Pacific Ranger District, 10 years.  
Brush Disposal Crew Foreman, Engine Foreman and Fire Prevention Technician,  
Sequoia National Forest, 5 years.  
Timber Stand Improvement, Hot Shot Crew and Brush Disposal Crew, Sequoia  
National Forest, 3 years.

**Other Related**

**Experience:** Instructor, Intermediate Fire Behavior, 10 years.  
Interdisciplinary Team Member, Author Fire/Fuels and Air Quality Sections,  
Cleveland Fire Area Recovery Environmental Impact Statement, 1992-1993.

**John McMillan**

Team Member, District Fire Management Officer. Coauthor Fire/Fuels Sections.

**Education:** B.S., Wildlife Management, California State Polytechnic University, San Luis  
Obispo, California, 1971.  
Graduate Technical Fire Management, University of Washington, 1983.

**Experience:** 25 Years  
District Fire Management Officer, Pacific Ranger District, Eldorado National  
Forest, 11 Years.  
Assistant District Fire Management Officer, Pacific Ranger District, 3 Years.  
Fuels Officer, Pacific Ranger District, Eldorado National Forest, 2 Years.  
Suppression Crew Foreman, Pacific Ranger District, 3 Years.  
Engine Foreman, Hot Springs Ranger District, Sequoia National Forest, 2 Years.  
Fire Prevention Technician, Hot Springs Ranger District, Sequoia National  
Forest, 2 Years.  
Engine Crewman, San Luis Obispo Ranger District, Los Padres National  
Forest, 3 Months.  
Backcountry Fire Guard, Cannell Meadow Ranger District, Sequoia National  
Forest, 2 Years.

**Other Related**

**Experience:** 16 Years  
Course Coordinator and Instructor, Intermediate Fire Behavior And Fire Ecology/  
Fire Effects.  
Interdisciplinary Team Member, Coauthor Of The Fire/Fuels Input to the  
Eldorado National Forest Land And Resource Management Plan.  
Team Leader/Interdisciplinary Team Member and Contributor on numerous  
Forest Service Projects.



**Mike Taylor**

Team Member, Botanist. Coauthor, Sensitive Plant Section.

Education: B.S. Horticulture, California State University, Chico, 1981.

Experience: 10 years  
Botanist, Eldorado National Forest, 2 years.  
Forest Technician, FS Central Zone Genetic Resource Program, 7 years.  
Forest Technician, Cone and Seed Extractory/Lab, Forest Service, Placerville  
Nursery, 1 year.

**Other Related**

Experience: Assistant Plant Breeder, Dairyland Seed Company, Sloughhouse, California,  
3.5 years.  
Biological Technician, Bureau of Land Management, Cedarville, California,  
6 months.  
Park Ranger, Michigan Department of Natural Resources, 4 seasons.

**INDIVIDUALS WHO CONTRIBUTED INFORMATION****Anne Boyd**

Contributor, Forest Geologist. Geology and Soils input.

Education: B.S., Geology, University of Delaware, Newark, 1984.

Experience: 9 years  
Forest Geologist, Supervisors Office, Eldorado and Tahoe National Forests,  
6 years.  
Geologist, Defense Mapping Agency, 3 years.

**Other Related**

Experience: Interdisciplinary Team Member and Contributor, various Forest Service projects.

**Christine Christiansen**

Contributor, Forest Hydrologist. Cumulative Watershed Effects Supplements, Hydrology input.

Education: B.S., Watershed Management, University of Arizona, 1989.

Experience: 6 years  
Hydrologist, Supervisor's Office, Eldorado National Forest.

**(Christine Christiansen, continued)**

## Other Related

Experience: 2 years  
Hydrological Aide, Agricultural Research Service.  
Interdisciplinary Team Member and Contributor, various Forest Service projects.

**Cyndy Duchscherer**

Contributor, Forestry Technician. Word Processing and Document Organization.

Experience: 11 years  
Forestry Technician, Pacific Ranger District, Eldorado National Forest.

**Mike Foster**

Contributor, Forest Botanist. Sensitive Plant input.

Education: B.A., Biology, California State University, Chico, 1985.

Experience: 4 years  
Forest Botanist, Supervisor's Office, Eldorado National Forest.

## Other Related

Experience: 2 years  
Range Technician, Plumas National Forest.  
Interdisciplinary Team Member and Contributor, various Forest Service projects.

**David P. Fournier**

Contributor, Forestry Technician. Timber Management Section input.

Education: M.S., Forestry, University of Maine, Orono, 1993.  
B.S., Forest Management, University of Maine, Orono, 1988.

Experience: 13 years  
Forestry Technician, Pacific Ranger District, Eldorado National Forest, 2 years.  
Forest Economics Researcher, Forest Management Department, University of Maine, Orono, 2 years.  
Harvest Inspector, Pacific Ranger District, Eldorado National Forest, 1 year.  
Forest Land Use Planner, Department of Maradi Environment Service, Republic of Niger, 2 years.  
Forestry Research Technician, Forest Pathology Lab, University of Maine, 1 year.  
Agroforestry Researcher, US Agency for International Development, AFORP, Haiti, 1 year.  
Industrial Weight Scaler, James River Corp., Old Town, Maine, 2 years.

**(David P. Fournier, continued)**

Harvest Operations Supervisor, Seabco Farm, Inc., St. Albans, Maine,  
1 year.

Timber Harvester, University Forest, University of Maine, Orono, 1 year.

**Tim Howard**

Contributor, District Timber Sale Preparation Officer. Cartographic input.

Education: Graduate Studies, Biological Sciences, California State University, Sacramento,  
1981-1982.

B.A., Environmental Studies, Chemistry minor, California State University,  
Sacramento, 1979.

Forest Engineering Institute, Oregon State University, Corvallis, 1991.

Forest Silviculture Institute, University of Washington, Seattle, 1995.

Experience: 18 years

Timber Sale Preparation Officer, Pacific Ranger District, Eldorado National Forest.

**Bob Logan**

Contributor, Forest Landscape Architect. Primary Author, Visual Resources Section.

Experience: 26 years

Landscape Architect, Eldorado National Forest, 10 years.

Landscape Architect Technician, Eldorado National Forest, 14 years.

**Other Related**

Experience: 12 years

Fire Management Officer, Cosumnes Ranger District (District consolidated in late  
1970s with Placerville and Amador Districts).

Supervisory Recreation Technician, Pacific Ranger District, Eldorado National  
Forest.

Fire Crew Foreman, Pacific Ranger District.

Recreation Technician, Pacific Ranger District.

Fire Crew Member, Pacific Ranger District.

Interdisciplinary team member and contributor, various projects on the Eldorado  
National Forest and Lake Tahoe Basin Management Unit.

**Rich Platt**

Contributor, District Resource Officer. Primary Author, Recreation and Range Sections.

Education: B.S., Natural Resource Management, California Polytechnic State University,  
San Luis Obispo, 1975.



**(Rich Platt, continued)**

Experience: 25 years  
Resource Officer, Pacific Ranger District, 10 years.  
Resource Forester, Pacific Ranger District, 3 years.  
Timber Sale Administrator/Timber Sale Preparation, Pacific Ranger District,  
4 years.  
Resource Assistant, Hot Springs Ranger District, Sequoia National Forest, 5 years.  
Timber Sale Administrator, Hot Springs Ranger District, 3 years.

**Other Related**

Experience: Interdisciplinary Team Leader and Member, various projects.  
Forest Service Representative, Jones Fork Hydroelectric Project.

**Don Yasuda**

Contributor, District Wildlife Biologist. Coauthor, Wildlife Section.

Education: B.S., Wildlife and Fisheries Biology, University of California, Davis, 1987.

Experience: 8 years  
Wildlife Biologist, Pacific Ranger District, Eldorado National Forest.

**Other Related**

Experience: Interdisciplinary Team Leader and Team Wildlife Biologist, Cleveland Fire Area  
Recovery Environmental Impact Statement, 1992-1993.  
Interdisciplinary Team Member and Contributor, various Forest Service projects..

## **CHAPTER VI**

### **DISTRIBUTION LIST**

An inquiry to receive this Draft Environmental Impact Statement was sent to individuals and organizations from mailing lists compiled by the Pacific Ranger District of the Eldorado National Forest. The following distribution list includes all those who responded to the inquiry, the individuals who attended scoping meetings or provided scoping comments, persons or organizations requesting copies of this report, and those state and federal agencies mandated to receive copies.

#### **Federal Agencies**

Eldorado National Forest, Supervisor's Office  
Eldorado National Forest, Amador Ranger District  
Eldorado National Forest, Georgetown Ranger District  
Eldorado National Forest, Placerville Ranger District  
Environmental Protection Agency  
Environmental Protection Agency, Region IX Office  
Environmental Protection Agency, Management Information Unit  
Lake Tahoe Basin Management Unit, Supervisor's Office  
US Congress, John T. Doolittle (4th District)  
US Department of Agriculture, Forest Service, David F. Thomas  
US Department of Agriculture, Forest Service, Washington Office  
US Department of Agriculture, National Agriculture Library  
US Department of the Interior, Office of Environmental Project Review  
US Senate, Barbara Boxer  
US Senate, Diane Feinstein

#### **State Agencies**

California Department of Fish and Game, Region 2  
California Department of Forestry  
California State Water Resources Control Board  
Governor Pete Wilson

**Local Agencies**

Alpine County Board of Supervisors  
Amador County Board of Supervisors  
Amador County Library  
Douglas County Board of Supervisors  
El Dorado County Air Pollution Control District  
El Dorado County and Georgetown Divide Resource Conservation Districts, Mark Hicks  
El Dorado County Board of Supervisors  
El Dorado County Environmental Management Department  
El Dorado County Library, Georgetown Branch  
El Dorado County Library, Placerville Branch  
El Dorado County Library, Pollock Pines Branch  
El Dorado County Library, South Lake Tahoe Branch  
Placer County Board of Supervisors

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Clarence Dilts, Sierra Club, Maidu Group  
Henry Espineli  
Steve Evans, Friends of the River  
John Ferrell, Wetsel-Oviatt Lumber Company  
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Carla M. Sanders  
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Vernon Trammel  
Vern and Dollie Warren  
Robert L. and Stephanie A. Weir  
Ken Wilde, Sierra Pacific Industries  
Jean Yang

*Please use this page for notes.*

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## Christiansen, Christine (continued)

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- 1995d CWE Supplement for Riverton Watershed, Whale Rock Project. Unpublished manuscript on file at Eldorado National Forest Supervisor's Office, Placerville, California.
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## GLOSSARY AND ACRONYMS

### Acronyms

This list of abbreviations and acronyms used in this document or the appendices is provided for quick reference. Terms that are not self-explanatory are defined in the Glossary, which follows.

<b>ARRA</b>	archaeological reconnaissance report addendum
<b>ASQ</b>	allowable sale quantity
<b>BF</b>	board foot (feet) of timber
<b>BMP</b>	best management practice
<b>CAS</b>	capable, available, and suitable
<b>CASPO</b>	California Spotted Owl Sierran Province Interim Guidelines
<b>CEQ</b>	Council on Environmental Quality
<b>CFR</b>	Code of Federal Regulations
<b>CIA</b>	compartment inventory analysis
<b>CMAI</b>	culmination of mean annual increment
<b>CWE</b>	cumulative watershed effect
<b>DBH</b>	diameter at breast height
<b>DEIS</b>	draft environmental impact statement
<b>EIS</b>	environmental impact statement
<b>EPA</b>	Environmental Protection Agency
<b>ERA</b>	equivalent roaded acre
<b>EVC</b>	existing visual condition
<b>FEIS</b>	final environmental impact statement
<b>FS</b>	Forest Service
<b>FSH</b>	Forest Service Handbook
<b>FSM</b>	Forest Service Manual
<b>FY</b>	fiscal year (USFS: October 1 - September 30)
<b>GPS</b>	Global Positioning System
<b>IDT</b>	interdisciplinary team
<b>LRMP</b>	Eldorado National Forest Land and Resource Management Plan
<b>MA</b>	management area
<b>MAI</b>	mean annual increment
<b>MBF</b>	thousand board feet (of timber)
<b>MIS</b>	management indicator species
<b>MMBF</b>	million board feet (of timber)
<b>NEPA</b>	National Environmental Policy Act of 1970
<b>NF</b>	National Forest
<b>NFMA</b>	National Forest Management Act of 1976
<b>OHV</b>	off-highway vehicle
<b>PAC</b>	Protected Activity Center (for spotted owl)
<b>PM</b>	particulate matter
<b>PNV</b>	present net value
<b>RD</b>	Ranger District
<b>R5</b>	Region 5: Pacific Southwest Region
<b>ROS</b>	recreation opportunity spectrum
<b>RPA</b>	Forest and Rangeland Renewable Resources Planning Act of 1974
<b>SAI</b>	sale area improvement
<b>S&amp;G</b>	standard and guideline
<b>SMZ</b>	streamside management zone
<b>SO</b>	Supervisor's Office
<b>SOHA</b>	spotted owl habitat area
<b>T&amp;E</b>	threatened and endangered species
<b>TOC</b>	threshold of concern
<b>TSI</b>	timber stand improvement
<b>USDA</b>	United States Department of Agriculture
<b>USFS</b>	United States Forest Service
<b>VQO</b>	visual quality objective
<b>WHR</b>	Wildlife Habitat Relationship

## Glossary

**activity fuels**

Fuels which have been directly generated or altered by management activity.

**adaptive management**

The process of implementing policy decisions as scientifically driven management experiments that test predictions and assumptions in management plans. Adaptive management provides for scientifically based decisions when the results of management actions are uncertain.

**age class**

An interval, usually 10 to 20 years, into which the age range of vegetation is divided for classification or use.

**allocation**

The assignment of sets of management practices (prescriptions) to particular land areas to achieve the goals and objectives of the alternative.

**allotment**

An area designated for grazing a prescribed number and kind of livestock.

**allowable sale quantity (ASQ)**

The quantity of timber intended to be sold from the lands suitable for timber production covered by the Forest Plan for a time period specified by the Plan. This quantity is usually expressed on an annual basis as the "average annual allowable sale quantity."

**aspect**

The compass direction that the slope of a land surface faces.

**back fire**

A fire set in front of an advancing main fire intended to remove fuels so that the main fire is stopped, turned or controlled.

**background**

As used in setting visual quality objectives, the view beginning 3-5 miles from the observer and as far into the distance as the eye can detect the presence of objects.

**basal area**

The cross-sectional area of tree stems, including the bark, measured at 4.5 feet above the ground; expressed in square feet/acre.

**benchmark**

An analysis of the supply potential of a particular resource, or of a set of resources subject to specific management objectives or constraints. Benchmarks define the limits within which alternatives can be formulated.



**best management practice (BMP)**

A practice or a combination of practices that is determined to be the most effective and practical means of preventing or reducing the amount of pollution generated by nonpoint sources to a level compatible with water quality goals. BMPs include structural and/or nonstructural controls and operation and maintenance procedures. BMPs for National Forests in California are shown in Water Quality Management for National Forest System Lands in California, USDA Forest Service, April, 1979, and have been approved by the California Water Quality Control Board. The BMPs are under section 208 of the Clean Water Act (PL 92-500).

**biodiversity (biological diversity)**

The variety of life in an area, including the diversity of genes, species, plant and animal communities, or ecosystems, landscapes and the interaction of these elements.

**biological evaluation (BE)**

A detailed review of Forest Service activities done in conjunction with the NEPA process to determine whether a proposed action will result in a trend toward sensitive species becoming Federally listed under the Endangered Species Act.

**biomass**

The total quantity at a given time of the living organisms of one or more species per unit land area, or all of the species of a community. Also used to refer to the total above-ground mass of all trees in an area, especially when considering the harvest of small diameter trees to be used as chips for fuel (see cogeneration).

**biotic**

Refers to life; living.

**board foot (BF)**

The amount of wood equivalent to a piece 12 inches long by 12 inches wide.

**browse**

Leaf and twig growth of shrubs, woody vines, and trees available for animal consumption, usually based on current year's growth; act of consuming browse.

**canopy**

The more-or-less continuous cover of branches and foliage formed collectively by the crowns of adjacent trees in a stand or forest.

**capability**

The potential of an area of land to produce resources, and supply goods and service, while allowing resource uses under an assumed set of management practices at given levels of management intensity. Capability depends on current conditions and site conditions such as climate, slope, landform, soils, geology and management practices such as silviculture and protection from fire.

**capable, available, suitable lands (CAS)**

National Forest System lands that have been determined to be capable, available, and suitable for timber management.

**CASPO Guidelines**

Management prescriptions outlined in the CASPO Report that are designed to protect the viability of the spotted owl.

**closed canopy**

A condition that exists when the crowns of the trees in a stand cover 100 percent of the potential open space.

**cogeneration**

The process of generating electrical energy for public use by burning combustible materials such as wood chips, bark or leaves.

**commodity**

A resource product with commercial value; a tangible or physical output such as timber, forage, minerals, and water.

**compartment**

The unit of land that is most commonly used to initiate project-level planning and implementation.

**corridor**

Connective links of certain types of vegetation between patches of suitable habitat which are necessary for certain species to facilitate movement of individuals between patches of suitable habitat. Also refers to transportation or utility rights-of-way.

**cover**

Vegetation used by wildlife for protection from predators and weather conditions, or in which to reproduce.

**cover/forage ratio**

The ratio, in percent, of the amount of area in forage condition to the amount of that area in cover condition.

**critical habitat**

Key land areas used by wildlife for forage, reproduction, or cover. Physical and biological features within these areas may require special management to conserve certain species.

**critical winter range**

Locations that provide food and shelter for California mule deer under moderately severe to severe winter conditions.

**crown**

The upper part of a tree carrying the main branch system and foliage.

**crown closure**

Percent of canopy closure.

**crown fire**

A fire that advances through the canopy of trees or shrubs independently of the surface fire.

**cruise**

The process of determining timber volumes and quality in the field.

**cubic foot per second (CFS)**

Unit measure of streamflow or discharge, equivalent to 449 gallons per minute or about 2 acre-feet per day.

**cull**

Any lumber production item rejected because it does not meet certain specifications.

**cultural (or heritage) resources**

The tangible and intangible aspects of cultural systems, living and dead, that are valued by a given culture or contain information about the culture. Cultural resources include, but are not limited to, sites, structures, buildings, districts, and objects associated with or representative of people, cultures, human activities and events.

**cumulative watershed effects (CWE)**

Any change in watershed processes which are influenced by land management activities that accumulate in time or space. Several methodological approaches are used to evaluate CWEs, including Equivalent Roaded Acres (or ERA), the approach applied here.

**debris flow**

The sudden downslope movement of the soil mantle; occurring on steep slopes, it is caused by the complete saturation of the soil from prolonged heavy rains. Also known as a debris slide, or landslide.

**decadence**

Refers to decaying or declining tree stands.

**decking area**

A designated area in the forest used for loading logs onto trucks; usually 1/4 -1/3 acre.

**dependent species**

A species for which a habitat element (e.g., snags, vegetative type) is deemed essential in order for the species to occur regularly or to reproduce.

**diameter at breast high (DBH)**

The diameter of a tree measured 4 feet 6 inches above the ground on the uphill side.

**dispersed recreation**

Outdoor recreation which occurs outside of planned and maintained recreational facilities, e.g., scenic driving, hunting, backpacking.

**diversity**

The distribution and abundance of different plant and animal communities and species within the area covered by a land and resource management plan.

**down logs**

Logs lying on the ground. In this document, only logs greater than 15 inches in diameter and 20 feet in length are counted in retention levels.



**duff**

The layer of partially and fully decomposed organic materials (leaves, pine needles etc.) lying below the new forest litter and immediately above mineral soil.

**economic efficiency**

A measure of how efficiently inputs are used to achieve outputs when all costs and benefits can be identified and valued. Usually measured by present net value or cost-benefit ratios.

**ecosystem**

The living organisms of an area, the physical environment in which they live, and the interactions between them.

**ecosystem management**

The use of an ecological management approach that blends the needs of people and environmental values in such a way that the National Forests and Grasslands represent diverse, healthy, productive and sustainable ecosystems. Healthy ecosystems are those that maintain biological diversity, biotic integrity and ecological processes over time.

**edge**

The area where plant communities meet or where successional stages or vegetative conditions within plant communities come together.

**effects**

Effects, impacts and consequences are synonymous in this document. Effects may be adverse, beneficial, significant, insignificant, actual, potential, short or long term, unavoidable or irreversible. In NEPA documents, effects are usually analyzed in three categories—direct effects, or those occurring at the same time and place as the triggering action; indirect effects, or those removed in time or distance from the triggering action; and cumulative effects, which includes an assessment of the past actions coupled with the proposed action and any reasonably foreseeable (ie., planned) actions in the area in the future.

**endangered species**

Any species designated as Endangered by the Secretary of the Interior. Generally, a species which is reduced in numbers or distribution so as to be in danger of extinction.

**environmental impact statement (EIS)**

A statement of environmental effects for a major Federally-proposed action, which is released to the public and other agencies for comment and review prior to a final management decision. The EIS is first issued as a Draft (DEIS). The Final EIS (FEIS) addresses and responds to public and agency comments on the draft. The decision maker chooses which alternative to select from the Final EIS, and subsequently issues a Record of Decision (ROD). The EIS is required by Section 102 of the National Environmental Policy Act (NEPA).

**ethnographic group**

Historically documented group or culture, herein meaning a relatively recent Native American (Indian) group.

**equivalent road acres (ERA)**

A method of categorizing the amount of soil compaction resulting from land management activities in terms of a common base - a compacted road surface. Roads are assigned an ERA value of 1.00 and all other disturbed areas are assigned ERA values less than or equal to one. The values are generally less than one, as most other management activities do not cause 100 percent of the ground surface to become compacted.

**even-aged stand**

A forest stand composed of trees having no or relatively small differences in age.

**fire intensity**

The rate of heat energy released per unit length of fire front, usually expressed as BTU/second/foot.

**fire line**

A constructed area around a fire which is dug to mineral soil to remove fuels and thereby control the fire's spread. In general, for a fire line to be effective, it should be 1.5 times as wide as the height of the fuel that is burning. When fire lines are cut by crews using hand tools, they are often referred to as handlines; when cut by equipment such as a bulldozer, they are called dozerlines.

**forage**

All browse and nonwoody plants used for grazing or harvested for feeding livestock or game animals.

**forb**

Any non-grasslike plant having little or no woody material on it. A palatable, broad-leaved, flowering herb whose stem, above ground, does not become woody and persistent.

**foreground**

The portions of a view between the observer and up to 1/4 or 1/2 mile distant.

**forest cover type**

A classification of forest land referring to a group of timber stands of similar development and species composition. Examples in California include the Douglas-fir, mixed conifer, pine, and true fir types.

**fuelbed**

The entire biomass, live and dead, that is available to burn.

**fuelbreak**

A wide strip or block of land on which native or pre-existing vegetation is open enough, or has been modified, so that fires burning into it can be more readily extinguished, or which will provide a safe area from which to work while controlling a fire. A *shaded fuelbreak* is one that retains a forested canopy, but with crown closure of less than 70%, such that a fire is unlikely to be carried through the canopy.

**fuel loading**

The oven-dry weight of all existing fuels in a given area. Loading is further analyzed by fuel size. Loading or mass per unit is usually expressed in tons per acre.

**fuels**

Any material capable of sustaining or carrying a wildland fire, usually natural material both live and dead.

**fuel treatment**

The rearrangement or disposal of natural or activity fuels to reduce fire hazard or to accomplish other resource management objectives.

**fugitive dust**

Particulate matter (PM), or solid particles, which originate primarily from soil. "Fugitive" dust is PM suspended in the air by wind and generated by wind and/or human activities, such as heavy equipment operations.

**geomorphology**

The study of the forms of the land surfaces and the processes creating them. Also the study of the underlying rocks or parent materials and the landforms present which were formed in geologic time.

**Global Positioning System (GPS)**

A geographic data collection system using a network of satellites to provide locational information.

**goal**

In Forest Planning, a goal is a concise statement that describes a desired condition to be achieved sometime in the future. It is normally expressed in broad, general terms that are timeless in that there is no specific date by which the goal is to be achieved.

**groundwater**

Subsurface zone in the part of the ground that is wholly saturated with water.

**habitat**

The sum total of environmental conditions of a specific place occupied by an organism, population, or community of plants and animals.

**historic range of variability**

Concept useful in defining ecosystem dynamics over time, the processes that change ecosystems, and the range of conditions that are feasible to maintain. The historic range of variability is often used as one reference point for a desired condition of an area or resource.

**holding area**

An area in which deer herds concentrate during a major migration.

**home range**

An area in which an individual animal spends all or most of its time.

**hydrology**

The properties, distribution and circulation of water; the study of water on the surface of land, in soil and in underlying rocks, and in the atmosphere, particularly with respect to precipitation, evaporation, infiltration, percolation, runoff and storage.



**infiltration**

The passage of water through the soil surface into the soil.

**inner gorge**

The lowermost slopes adjacent to stream channels having gradients in excess of 65%, separated from upslope areas by a distinct break in slope. The inner gorge is formed primarily by slides and surface erosion triggered by stream downcutting, oversteepening and undercutting.

**intensive timber management**

Timber management practices carried out to increase timber yield per acre.

**interdisciplinary team (IDT)**

A group composed of individuals with different training who solve a problem or perform a task through frequent interaction so that disciplines can combine to provide new solutions.

**intermittent streams**

A stream or portion of a stream that, in general, flows during wet seasons and is dry during dry seasons. The groundwater table lies above the bed of the stream during the wet season but drops below the bed during the dry season.

**irretrievable effects**

Applies to losses of production or use of renewable natural resources for a period of time. For example, timber production from an area is irretrievably lost during the time an area is used for skiing. If the use is changed, timber production can be resumed. The production lost is irretrievable, but the action is not irreversible.

**irreversible effects**

Decisions causing changes which cannot be reversed. Once used, the resource cannot be reinstated, nor can opportunities be recovered. Applies to nonrenewable resources, such as minerals, and cultural resources.

**K-V funds**

Funds collected and used for resource improvement on timber sale areas. The Knutson-Vandenberg (K-V) Act of 1930 requires purchasers of National Forest timber to make deposits of money as part of the payment for the timber to cover the cost of reforestation and timber stand improvement. The National Forest Management Act of 1976 expanded this authority to include "protecting and improving the future productivity of the renewable resources of the forest land on such sale area, including sale area improvement operations, maintenance and construction, reforestation, and wildlife habitat management."

**ladder fuels**

Fuels that provide vertical continuity between the surface fuels and crown fuels in a forest stand, thus contributing to the ease of torching and the spread of fire into the crowns of trees.

**landing**

Any place where logs are assembled for further transport, commonly with a change in the transportation method, such as from tractor to truck.

**landscape**

A region which includes a variety of plant and animal communities and environments.

**management area (MA)**

A contiguous area of land used in planning to which one or more prescriptions are applied. Management areas are areas with similar characteristics, similar capability and common management direction. Management areas do not vary between alternatives; however, the prescriptions applied to them may vary.

**management indicator species (MIS)**

Species selected to represent fish, wildlife, or vegetation in directing and coordinating forest management and monitoring the effects of planned management activities.

**management practice**

A specific activity, measure, course of action, or treatment.

**management prescription**

Management practices and levels of intensity selected and scheduled for application on a specific area to further forest goals and objectives.

**mature timber**

Trees that have attained full development, particularly height, and are in full seed production.

**merchantable timber**

Timber of saleable quality.

**middleground (middle distance)**

As applied to visual quality objectives, the space between the foreground and the background in a picture or landscape. The area located from 1/4-1/2 to as much as 3-5 miles from the viewer.

**minimum management requirement (MMR)**

Absolute minimum requirements taken from 36 CFR 219.27 and generally outside of the Forest Service authority to change. They are needed for consistency of analysis between Forests.

**mitigation**

Actions to avoid, minimize, compensate, reduce, eliminate, or rectify the adverse effects of a management practice.

**modification**

See *visual quality objectives*.

**monitoring and evaluation**

The evaluation, on a sample basis, of Forest Plan management practices to determine how well objectives have been met, as well as the effects of those management practices on the land and environment.

**mortality**

Dead or dying trees resulting from forest fire, insects, diseases, climatic or other factors.

**Native American**

Person who is a member of an ethnographic Indian group or tribe which has a common set of traditions and history native to this continent.

**natural fuels**

Fuels not directly generated or altered by management activity. This includes fuels which have accumulated because of deliberate fire exclusion.

**natural opening**

A break in the forest canopy; an area of essentially bare soil, grasses, forbs, or shrubs in an area dominated by trees.

**natural regeneration**

The renewal of a tree crop by natural means, without human seeding or planting. The new crop is grown from self-sown seed or by vegetative means, such as root suckers.

**objective**

In Forest Planning, an objective is a concise, time-specific statement of measurable planned results that respond to pre-established goals. An objective forms the basis for further planning to define the precise steps to be taken and resources used in achieving identified goals.

**off-highway vehicle (OHV)**

Any motorized vehicle capable of cross-country travel on or immediately over land, water, snow, ice, or other natural terrain. Examples of OHVs include motorcycles, four-wheel drive vehicles and snowmobiles.

**old growth**

See *seral stages*.

**opening**

In timber terms, an area of forest land from which timber has been harvested (generally using even-aged silviculture). Openings will generally be 5 to 40 acres in size. An opening is no longer considered an opening when a specified number of trees per acre within a specific forest type and site class have reached 4.5 feet in height.

**output**

A product, service, or on-site use produced from forest and rangeland resources.

**overstory**

That portion of the trees in a forest which form the upper or uppermost layer.



**overstory removal**

Removal of the last seed-bearing or shelter trees after regeneration is considered to be established. Under a shelterwood method, it is the last removal cutting.

**partial retention**

See *visual quality objectives*.

**perennial stream**

A stream or portion of a stream that flows throughout the year. The groundwater table lies above the bed of the stream at all times.

**plantation**

A stand of trees resulting from planting or artificially seeding an area.

**prescribed burn**

Intentional use of fire under predetermined weather and fuel conditions to achieve specific objectives, e.g., disposal of slash, control of unwanted vegetation.

**present value**

The value which results when benefits or costs expected to occur in the future are discounted.

**protected activity center (PAC)**

A 300-acre protected area around known or suspected spotted owl nest sites.

**receipts**

Those benefits for which money will actually be paid to the Forest Service: recreation fees, timber sales, mineral leases, and special use fees.

**reconstruction**

Any modification, improvement, or renovation of an existing facility.

**recreation opportunity spectrum (ROS)**

A means of classifying and managing recreation opportunities based on physical setting, social setting, and managerial setting. The six different ROS classes, briefly described, are:

- a. Primitive (P) - An area 3 miles or more from roads and trails with motorized use; generally 5,000 acres or more in an essentially unmodified natural environment.
- b. Semi-primitive nonmotorized (SPNM) - An area 1/2 mile from roads and trails with motorized use; generally 2,500 to 5,000 acres with only subtle modifications to an otherwise natural setting.
- c. Semi-primitive motorized (SPM) - Same as semi-primitive nonmotorized but with motorized use of roads and trails, including OHV touring, snowmobile, hiking, cross-country skiing, etc.
- d. Roaded natural (RN) - An area 1/2 mile or less from roads; resource modifications range from evident to strongly dominant.

e. Rural (R) - The setting is substantially modified with structures or other cultural modifications.

f. Urban (U) - The setting is strongly dominated by structures, highways, and streets.

**regeneration**

Reestablishing a crop of trees on forest land by natural or artificial methods. Also, the young crop itself, which commonly is referred to as reproduction.

**regeneration cutting**

Logging activities in stands to allow new trees to be planted; usually applied to stands which should be reforested because of poor stocking, health, thrift, quality, or composition.

**resiliency**

The ability of a landscape to recover quickly to the conditions and relationships which existed prior to a disturbance.

**retention**

See *visual quality objectives*.

**return interval**

The mean time between disturbances on any given piece of ground (sometimes known as a "cycle" or the "turnover time").

**riparian area**

Geographically delineated areas, with distinctive resource values and characteristics, that are comprised of both the terrestrial area adjacent to and inclusive of the riparian ecosystem and the aquatic ecosystems. Land areas to which limited management activities are applied in the interest of affording added protection to riparian area dependent resources and water quality, including all areas adjacent to perennial streams, lakes, and other water bodies. Exact boundaries of riparian areas are determined by on-site surveys.

**road types**

Roughly categorized into three types: arterial, usually two-lane surface roads connecting with public highways; collector, single or double lane surfaced roads accessing small land areas; and local, generally native surface, single land roads accessing a single resource facility such as a landing, trailhead or campground. For maintenance purposes, roads are divided into "levels":

Level 1 – These are intermittent service roads. Management direction requires that these roads be closed or otherwise blocked to traffic. Basic custodial maintenance is performed to protect the road and to keep damage to adjacent resources to an acceptable level.

Level 2 – Level 2 is assigned where management direction requires that roads be open for limited passage of traffic. Traffic is normally minor, usually consisting of one or a combination of administrative, permitted, dispersed recreation, or other

specialized uses. These roads are normally characterized as single-lane, primitive type intended for use by high clearance vehicles. Passenger car traffic is not a consideration.

Level 3 – Management direction requires these roads to be open and maintained for safe travel by a prudent driver in a passenger car. Traffic volumes are minor to moderate; however, user comfort and convenience is not considered a priority. Level 3 roads are normally characterized as low speed, single-lane with turnouts and spot surfacing.

Level 4 – Level 4 is assigned where management direction requires the road to provide a moderate degree of user comfort and convenience at moderate travel speeds. Traffic volumes normally require a double-lane aggregate surface road, although some are single-lane and are either paved or dust-abated, or both. These roads are normally classified as collector or minor arterial roads.

Level 5 – Management direction requires these roads to provide a high degree of user comfort and convenience. These roads are normally double-lane, paved facilities. Some may be aggregate surface and dust-abated. These roads are normally classified as arterials.

**rotation**

The length of time between the formation or regeneration of a tree stand and its final cutting. Also, rotation in a disturbance regime is used to refer to the average period of time over which an entire area becomes subject to disturbance (such as wildfire).

**salvage**

The harvest of trees that have been killed or are dying from fire, flood, windstorm, disease or insect attack to minimize wood fiber deterioration and protect the remaining trees.

**sanitation cutting**

The removal of dead, diseased, insect-infested, damaged, or otherwise low vigor trees to minimize losses from pests, prevent the spread of insects and disease, and improve or maintain net growth prior to regeneration cutting.

**sawtimber**

Collectively, the portions of trees suitable in size and quality for the production of lumber (see also *size class*).

**scoping process**

Process used to identify issues and concerns which are within Forest Service authority to resolve.

**sedimentation**

The transporting and disposition of loose soil and rock material by concentrated flows of water.

**seed step cut**

Regeneration cutting which removes all the mature timber except for the number of seed trees which are needed to provide seed for reproducing the stand.



**sensitive species**

Species recognized by the Regional Forester as needing special management in order to prevent them from becoming endangered or threatened. Species designated by the Regional Forester and included on the Region's Sensitive Species list.

**seral stages**

Stages in the successional development of vegetation and associated animal communities that are distinguished by composition and structure from other phases, and generally divided into three phases:

Early Seral: Plant and animal communities that colonize an area immediately following a disturbance. Species are often called 'pioneer species'; these are eventually replaced with mid-seral species through the process of succession.

Mid-Seral: Plant and animal species that cannot become established on freshly disturbed sites, but which replace early seral species through the process of succession.

Late Seral: Relatively stable plant and animal communities existing near the final, ecological climax stages of a forest; characterized by large, old trees (or 'old growth'). Persists until a disturbance reverts the process back to early or mid-seral stages.

**silvicultural prescription**

A plan for management of an individual timber stand including harvesting, reforestation, and timber stand improvement.

**site preparation**

Preparing an area of land for reforestation; may include removing unwanted vegetation and debris from a site.

**size class**

A standard size classification system used for timber management planning inventories in California. Tree size-class is measured as the mean diameter at breast height of dominant trees. Class 2 trees are less than 12 inches in diameter, Class 3 are 12-23.9 inches in diameter, and Class 4 are more than 24 inches in diameter. Tree size is sometimes also referred to under a different classification system: seedling/sapling (less than 5 inches in diameter), pole timber (5 to 8 inches), and sawtimber (greater than 8 inches).

**skid trail**

Routes along which logs are dragged by a tractor or rubber tired skidder from the stump to a landing point where they are loaded onto a truck.

**slash**

The residue left on the ground after timber cutting, or after storms, fire, etc. It includes unutilized logs, uprooted stumps, broken stems, branches, twigs, leaves, bark, and chips.

**snag**

A standing dead tree. For wildlife purposes, one that is at least 15 inches DBH and 20 feet tall.

**soil productivity**

The natural capacity of a soil to produce a specified plant or sequence of plants under a specified system of management.

**spotted owl habitat area (SOHA)**

A land management allocation designated in the Eldorado LRMP to protect mature timber stands that provide suitable habitat for late successional wildlife species, particularly the spotted owl. SOHAs vary in size from 1,650 acres to 2,650 acres, depending on management intensity.

**stand**

A community of trees or other vegetation sufficiently uniform in composition, constitution, age, spatial arrangement, or condition to be distinguishable from adjacent communities and to thus form a management entity. The basic unit for silvicultural prescriptions.

**stand exam**

An inventory process used to determine forest tree characteristics, such as species, number, size and growth rates.

**stand replacing fire**

A fire that burns so intensely it destroys an entire area of the forest that is relatively homogenous.

**standards and guidelines**

In Forest Plans, standards and guidelines are requirements which preclude or impose limitations on resource management activities, generally for the purposes of environmental protection.

**stream class**

A classification given to all named drainages or stream channels on the Forest, based on stream size, season, amount of flow, importance as a fishery or water source, and other characteristics. They range from Class I (largest, most important) to Class V (always intermittent).

**streamside management zone (SMZ)**

An administratively designated zone designed to call attention to the need for special management practices aimed at the maintenance and/or improvement of watershed resources. SMZs may include floodplains and wetlands, riparian areas, inner gorges, perennial streams, and intermittent streams showing signs of recurrent annual scour or deposition.

**stumpage**

The value of timber as it stands uncut in terms of dollar value per thousand board feet.

**succession**

The gradual supplanting of one plant community by another as a site changes over time, until a climax community is reached.

**suppression**

Actions taken to exclude, extinguish or confine a fire:

**surface fire**

A fire that burns on surface layers of vegetation, not reaching the crowns of trees.

**sustainability**

The ability of an ecosystem or species to respond to change (resiliency) and persist by returning to some equilibrium (stability).

**thinning**

A cutting made in an immature stand to stimulate the growth of remaining trees and increase the total yield of useful material from the stand. Cut may or may not have commercial value.

**threatened species**

Any species designated as "threatened" by the Secretary of the Interior. This is a slightly lower designation than "endangered" and is intended to prevent the decline of these species to a point at which the status would change to endangered.

**threshold**

The point or level of activity beyond which an undesirable set of responses begins to take place within a given resource system.

**threshold of concern (TOC)**

The upper limit of watershed tolerance to externally applied pressures such as climate and land use. This tolerance is measured in percent of Equivalent Roaded Acres (ERA).

**timber production**

The purposeful growing, tending, harvesting, and regeneration of stands of trees to be cut into logs, bolts, or other round sections for industrial or consumer use. Does not include production of fuelwood.

**timber stand improvement (TSI)**

The use of noncommercial thinning, cleaning, brushing, and intermediate cutting to eliminate or suppress less desirable vegetation and improve composition, condition, structure, or growth of a stand.

**type conversion**

The conversion of one type of vegetation cover to another, such as oak woodland to conifer forest, manzanita brushfield to conifer stand, etc.

**underburning**

Prescribed burning under a canopy of timber. (Normally at moderate to low fire intensity levels, with flame heights and vegetation scorch heights designed to be within acceptable resource management limits.) Also referred to as *understory burning*.

**understory**

Low-lying vegetation (herbaceous, brush or reproduction) growing under a stand of trees. Also, that portion of trees in a forest stand below the overstory.



**utilization**

The removal of slash, submerchantable trees, and dead and down material for fire hazard reduction and site preparation.

**variety class**

A classification system for establishing three visual landscape categories according to the relative importance of the visual features. This classification system is based on the premise that all landscapes have some visual values, but those with the most variety or diversity of visual features have the greatest potential for having or attaining high scenic value.

1. Distinctive (variety class A). Unusual and/or outstanding landscape variety that stands out from the common features in the landscape.
2. Common (variety class B). Prevalent, usual, or widespread landscape variety; also refers to ordinary or undistinguished visual variety.
3. Minimal (variety class C). Little or no visual variety in the landscape; monotonous or below average compared to the common features in the landscape.

**vegetation management**

The practice of manipulating the species mix, age, fuel load, and distribution of wildland plant communities within a management area. It includes prescribed burning, grazing, chemical applications, biomass harvesting, and any other economically feasible method of enhancing, retarding, or removing the above ground parts of plants.

**viable populations**

Sufficient numbers of individuals of reproductive age, geographically distributed so that the population can maintain its existence in the planning area over time.

**viewshed**

The landscape seen or potentially seen from all or a logical part of a travel route, use area, or water body.

**visual absorption capability (VAC)**

The ability of the landscape to withstand management manipulation without significantly affecting its visual character. Rated as high, moderate, and low.

**visual quality objective (VQO)**

A set of measurable maximum levels of future alteration of a characteristic landscape. These levels are as follows:

1. Preservation (P). Ecological change only in these areas.
2. Retention (R). Human activities are not evident to the casual Forest visitor.
3. Partial Retention (PR). Human activity may be evident but must remain subordinate to the characteristic landscape.

4. **Modification (M).** Human activity may dominate the characteristic landscape but must, at the same time, follow naturally established form, line, color, and texture. It should appear as a natural occurrence when viewed in foreground or middleground.
5. **Maximum modification (MM).** Human activity may dominate the characteristic landscape but should appear as a natural occurrence when viewed as background.
6. **Enhancement (E).** A short-term management alternative used with the express purpose of increasing positive visual variety where little variety now exists.

**volume**

Quantity of timber based on standing net board feet per acre.

**waterbar**

An erosion control structure used as a cross drain to divert water from road or skid trail surfaces, or an inside ditch to prevent gullyng on the road surface.

**watershed**

The total area above a given point on a stream that contributes water to the flow at that point.

**water yield**

The runoff from a watershed, including groundwater outflow, over a given period of time. Water yield is precipitation minus evapotranspiration.

**wetland**

An area inundated by surface or ground water with a frequency sufficient to support, and under normal circumstances, supporting a prevalence of vegetation or aquatic life that requires saturated or seasonally saturated soil conditions for growth and reproduction. Wetlands generally include swamps, marshes, bogs, and similar areas such as sloughs, potholes, wet meadows, river overflows, mud flats, and natural ponds.

**wildfire**

An unplanned fire usually requiring suppression action.

*Please use this page for notes.*



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March 1996



# **Whale Rock Forest Health Multi-Resource Project**

**Draft Environmental  
Impact Statement**

**Appendices**





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# **WHALE ROCK FOREST HEALTH MULTI-RESOURCE PROJECT**

**Forest  
Service**

## **Draft Environmental Impact Statement**

Pacific  
Southwest  
Region

**Eldorado National Forest**

March 1996



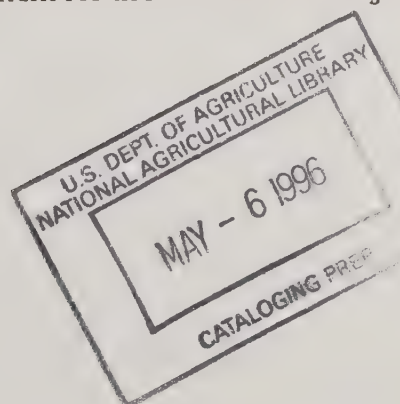
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## **APPENDIX A**

# **APPLICATION OF BEST MANAGEMENT PRACTICES TO IMPROVE OR PROTECT WATER QUALITY IN THE WHALE ROCK PROJECT AREA**

ELDORADO NATIONAL FOREST

PACIFIC RANGER DISTRICT



*Please use this page for notes.*

## **APPENDIX A**

### **WHALE ROCK PROJECT BEST MANAGEMENT PRACTICES**

#### **EFFECTIVENESS**

Best Management Practices (BMPs) are measures certified by the State Water Quality Control Board and approved by the Environmental Protection Agency (EPA) as the most effective means of reducing water quality impacts from non-point sources of pollution.

Forest Management and construction and use of associated roads in the terrain of forested mountains have long been recognized as sources of non-point water quality pollution. Non-point pollution is not, by definition, controllable through conventional treatment plant means. Non-point pollution is controlled or reduced by containing the pollutant at its source, thereby reducing delivery to surface water. Sections 208 and 319 of the Federal Clean Water Act, as amended, acknowledge land treatment measures as being an effective means of controlling non-point sources of water pollution when properly selected and applied.

Working cooperatively with the California State Water Quality Control Board, the Forest Service developed and documented non-point pollution control measures applicable to National Forest System Lands. Following evaluations of the control measures by State Water Quality Control personnel as they were applied on-site during management activities, an assessment of monitoring data and the completion of public workshops and hearings, the Forest Service's measures were certified by the State and approved by EPA as the most effective means the Forest Service could implement to control non-point source pollution. These measures were termed 'Best Management Practices' (BMPs). BMP control measures are designed to accommodate site-specific conditions. They are tailor-made to account for the complexity and the physical and biological variability of the natural environment. In the 1981 Management Agency Agreement between the State Water Resources Control Board and the Forest Service, the State agreed that 'the practices and procedures set forth in the Forest Service document constitute sound water quality management and, as such, are the best management practices to be implemented for water quality protection and improvement on NFS land. The implementation of BMPs is the performance standard against which the success of the Forest Service's non-point pollution water quality management efforts are judged.

The Clean Water Act provided the initial test of effectiveness of the Forest Service non-point pollution control measures where it required the evaluation of the practices by the regulatory agencies (State Board and EPA) and the certification and approval of the practices as the 'best' measures for control. Another test of BMP effectiveness is the capability to custom fit them to a site-specific condition where non-point pollution potential exists. The Forest Service BMPs are flexible in that they are tailor-made to account for diverse combinations of physical and biological environmental circumstances.

A final test of this effectiveness of the Forest Service BMPs is their demonstrated ability to protect the beneficial uses of the surface waters in the State. The BMPs incorporate 75 years of erosion control and watershed protection experience and are based on sound scientific principles. The land treatment measures incorporated into Forest Service BMPs evolved through research and development measures, and they have been monitored and modified over several decades with the expressed purpose of improving the measures and making them more effective. On-site evaluations of the control measures by State regulatory agencies found the practices were effective in protecting beneficial uses and were certifiable for Forest Service application as their means to protect water quality.

Best Management Practices, as described herein, have been certified by the State Water Quality Control Board as effective in protecting beneficial uses. These practices have been applied for many years in all timber sales and salvage areas in all watersheds on the Pacific Ranger District where timber management activities occur. Most of the BMPs have been a standard and integral facet of timber management practices on the Pacific Ranger District in practice, though not specifically in name, for many years prior to the formal adoption of "Best Management Practices" in 1979. BMPs have been applied in physical and biological circumstances that are similar to the project area. Following their implementation, there has been a reduction in adverse impacts to cold water fisheries habitat conditions and domestic uses of surface waters. The practices specified herein are expected to be equally effective in maintaining the beneficial uses.

The following pages contain a list of the primary BMPs planned for application in the Whale Rock Project Area. Included is a description of the practice, what it is designed to accomplish in regards to protecting water quality, and specific locations where Forest resource specialists (hydrologists, geologists, engineers, foresters, etc.) have observed the BMP to be effective in accomplishing the stated objective for environmental situations similar to those in the Whale Rock Project area.

## **RESOURCE PROTECTION MEASURES IN PROJECT IMPLEMENTATION**

Following is a description of the *applicable* BMPs, how they have been or will be implemented, who is responsible for implementation, references in the project documentation, and the locations similar to this project where the BMPs have been effectively implemented during the last five years.

### **1.1 Timber Sale Planning**

**Objective:** To introduce water quality and hydrologic considerations into the timber sale planning process.

In the preparation of this environmental analysis, several earth science specialists have participated in the interdisciplinary team (ID team) assessment. A Forest Hydrologist, Forest Soil Scientist and Forest Geologist reviewed the EIS. Field reviews of the Whale Rock Project area were also made by the respective specialists.



References: Environmental Assessment, Stand Record Cards, Harvest Activity cards, specialist reports. TSC Provisions C6.422#, C6.5, C6.6, C6.601, C6.602, C6.603.

Location: Deja Vu Timber Sale, Black Flag Insect Salvage Timber Sale, Wench Timber Sale, East Union Timber Sale, Cox Canyon Timber Sale.

## **1.2 Timber Harvest Unit Design**

**Objective:** To insure that timber harvest unit design will secure favorable conditions of water flow and of water quality.

The timber harvest proposals have been reviewed by members of the ID team. Specialists, identified as those who may recognize an impact to their specific resource, have provided their concerns and recommendations.

The Sale Layout Forester has flagged boundaries of proposed harvest units so as to provide site specific locations of harvest units for earth specialist review to ensure that timber harvest will secure favorable conditions for water flow and water quality. During the review process certain watershed improvement needs (WIN) projects were identified and are now included in project design. These WIN projects were identified previously in this EIS. Areas of steep ground that were not suitable for tractor operations were identified and eliminated during harvest unit design. SMZ boundary locations were identified based on terrain, LRMP direction and on-the-ground conditions. Unit boundaries were adjusted as necessary to eliminate adverse skidding.

The Timber Sale Administrator and the administrator of post-sale slash disposal will be primarily responsible for the ground accomplishment of the prescription during logging and post-sale treatment.

References: Environmental Assessment, Stand Record Cards, Harvest Activity cards, sale review and events narrative in project file, Provisions #C6.428, C6.5, C6.6, C6.601, C6.602, C6.603, Prospectus.

Location: Black Flag Timber Sale, Gap Timber Sale, Wench Timber Sale, East Union Timber Sale, Wrights Helicopter Insect Salvage Timber Sale.

## **1.3 Use of Erosion Hazard Rating for Timber Harvest Unit Design**

**Objective:** To identify high erosion hazard areas in order to avoid land disturbance and associated downstream water quality degradation.

Certain areas of high erosion hazard have been identified and avoided during harvest unit design. These areas include scattered small areas that in some instances are not reasonably mappable, along with larger areas. In general, the maximum slope upon which operations are planned is 35%. The Timber Sale Administrators are extremely knowledgeable of sale layout situations that create erosion control problems. Swales,

areas supporting plant species that are wet soil indicators such as dogwood, steep slopes and areas that show signs of erosion are typical field situations that are recognized and avoided where possible. The sale administrator is familiar with the erosion hazard rating procedures and will use erosion hazard ratings (EHRs) based on soil surveys, specialist reports and site specific topography to control all phases of the logging operations. The objective is to identify, protect and avoid land disturbances within areas of high erosion potential to prevent downstream water quality degradation. The Pre-operations meeting agreements with the Purchaser include specified waterbar spacing related to EHR. Waterbar construction is inspected and approved by the Timber Sale Administrator and documented on sale inspection forms.

References: Stand Record Cards, Harvest Activity cards, Pre-operations meeting checklist.

Location: Deja Vu Timber Sale, Cold Springs Timber Sale, Westend Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

#### **1.4 Use of Sale Area Maps for Designating Water Quality Protection Needs**

**Objective:** To delineate the location of protection areas and available water sources as a guide for both the contractor and the Sale Administrator, and to insure their recognition and proper consideration and protection on-the-ground.

The Sale Preparation Forester is responsible for the preparation of a Sale Area Map which identifies these features which have been identified by the ID team:

- a. Location of stream courses to be protected (LRMP planning Mylar Quads-SO);
- b. Wetlands (meadows, lakes, etc.; Mylar Quads Wildlife SO);
- c. Boundaries of harvest units;
- d. Specified roads, construction and/or reconstruction (specified in the Transportation Analysis Report);
- e. Roads where log hauling is prohibited (specified in the Transportation Analysis Report);
- f. Structural improvements (those already in place will be protected);
- g. Areas for different skidding and yarding methods (specified in the original EIS);
- h. Sources of rock for road work, rip-rapping, etc. (specified in the Transportation Analysis Report, Contract Design and Typical Specifications);
- i. Water sources available for contractor's use (specified in the Transportation Analysis Report, Sale Area Map and applicable provisions); and
- j. Other features required by Division 'C' contract provisions.

These areas will be ground reviewed by the Purchaser and the Sale Administrator prior to harvesting.

References: TSC Provisions B1.1, B6.5, B6.6, C6.5, C6.6, Stand Record Cards and Harvest Activity cards/maps are used to develop the Sale Area Map and corresponding mitigations to be included in the contract.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

### **1.5 Limiting Operating Period of Timber Sale Activities**

**Objective:** To ensure that the Purchaser conducts his operation, including erosion control work, road maintenance, etc., in a timely manner within the period of the Timber Sale Contract.

The Sale Preparation Officer prepares the contract to include a required 'Plan of Operation' and an 'Operation Schedule' from the Purchaser and will designate any 'Limited Operating Periods' which have been established by the ID team. This will insure that the Purchaser conducts his operations, including erosion control work, road maintenance, etc., in a timely manner. Contract provision C6.6 requires installation of erosion control structures within 15 days of completion of skidding operations, unless conditions warrant more immediate action. A road maintenance plan is agreed to at the preoperations meeting that specifies timing and requirements for road maintenance.

References: TSC Provisions B6.3, B6.31, B6.65, B6.6, C5.4, C6.3, and C6.311, Stand Record Cards and Harvest Activity Cards, Environmental Assessment, Pre-operations meeting checklist and road maintenance plan.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

### **1.6 Protection of Unstable Areas**

**Objective:** To provide for special treatment of unstable areas and thereby avoid triggering mass movements of the soil mantle and resultant erosion and sedimentation.

Geologically unstable areas are identified initially using geological resource inventory maps which are then field verified by the Zone Geologist on a case by case basis. Protection measures are determined at that time by the Geologist and are implemented by the Sale Administrator.

*No unstable areas will be affected by this project.* The inner gorge areas discussed in the EIS will not be entered for harvest, nor will roads be constructed within these areas.

References: Environmental Assessment, Stand Record Cards, Harvest Activity Cards, specialist reports.



## 1.7 Prescribing the Size and Shape of Clearcuts

**Objective:** To control the physical size and shape of clearcuts as a means of reducing stream sedimentation.

*The Whale Rock Project does not propose any clearcuts.* If during the life of this project there develops an identified need for a clearcut, a supplement to the EIS will be completed. In such a situation, the size and shape of clear cuts (regeneration cuts) are determined on-the-ground by the District Silviculturist with coordination of the necessary resource specialists to mitigate concerns regarding erosion. Clearcutting units and partial cut units are designed with considerations of size, shape, and proximity to streams.

The Timber Sale Administrator will implement the Silviculturist's prescription on-the-ground.

References: Environmental Assessment, Stand Record Cards, Harvest Activity Cards, specialist reports, sale review and events narrative in the project file, Timber Sale Contract Map.

Location: Wench Timber Sale, East Union Timber Sale, South Rubicon Timber Sale.

## 1.8 Streamside Management Zone Designation

**Objective:** To designate a zone along streams and wetlands where prescriptions are made that will minimize the effects of nearby logging and related land disturbance activities.

The Sale Preparation Officer is responsible for including the designated stream side management zones as defined by the EIS, Eldorado National Forest Land Management Plan (LRMP), and district streamclass maps in the sale contract and identifying them on-the-ground if needed. Earth science specialists spot check harvest unit locations and SMZ locations, particularly in areas that the various specialists consider most sensitive. State Water Quality Board members and hydrologists have made monitoring visits to various sales to determine compliance.

The Timber Sale Administrator is responsible for contract compliance during harvest operations. SMZ boundaries are flagged on-the-ground whenever they are more or less than 50 feet. By designating the streamcourse on the sale area map, a minimum 50 foot buffer is contractually established. The LRMP and specialist recommendations are used as a guide in establishing the appropriate protection zone. In general, Class IV ephemeral drainages and swales which are on the Sale Area Map will be protected on-the-ground by the Sale Administrator and Purchaser giving a 50 foot streamside zone on each side. Class I, II, and III streamcourses are given larger streamside zone widths that are identified on-the-ground. These provisions are to minimize effects to water quality from land disturbing activities.

References: Environmental Assessment, Stand Record Cards, Harvest Activity Cards, sale review and events narrative in the project file. TSC Provisions C5.421, B6.5, C6.5.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

### **1.9 Determining Tractor Loggable Ground**

**Objective:** To protect water quality from degradation caused by tractor logging ground disturbance.

The Sale Preparation Officer and Logging Systems Engineer (if specialized logging systems are considered) determine, based on Erosion Hazard Ratings, specialist reports and on-the-ground conditions, what areas are tractor versus cable or helicopter loggable ground. The objective is to identify and protect land disturbances within areas of high erosion potential to prevent downstream water quality degradation.

References: Environmental Assessment, Stand Record Cards, Harvest Activity Cards. TSC Provision B1.1, Sale Area Map, C6.422.

Location: Tent Cable Timber Sale, Silver Cable Timber Sale, Two Peaks Helicopter Sale, Wrights Helicopter Sale, Black Flag Insect Salvage Sale, Big Cat Timber Sale, Cox Canyon Timber Sale.

### **1.10 Tractor Skidding Design**

**Objective:** By designing skidding patterns to best fit the terrain, the volume, velocity, concentration, and direction of runoff water can be controlled in a manner that will minimize erosion and sedimentation.

The Sale Preparation Officer is responsible for including ID team prescriptions for sensitive areas from this EIS report in the timber sale contract by the use of special contract provisions. Acreages of special erosion control work, such as grass seeding and ripping of landings, skid roads and temporary roads, included by Sale Preparation Officer in contract package. The acreages identified for treatment are calculated by determining the number of landings, and miles of skid road or temporary road.

The Sale Administrator is responsible for executing these prescriptions in skid trail design on-the-ground with the Purchaser by agreeing with the Purchaser's proposed locations prior to construction. The Purchaser is required to have the capability to utilize end-line yarding methods which limits on-the-ground disturbance in sensitive areas. The Sale Administrator documents skid trail agreements and design on a sale inspection form for each operating area.

References: Environmental Assessment, Stand Record Cards, Harvest Activity Cards. TSC Provisions B6.422, B6.424, C6.422#, C6.424, C6.41, and the Timber Sale Administration Handbook.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

### **1.12 Log Landing Location**

**Objective:** To locate landings in such a way as to avoid creation of damaging watershed conditions and resulting water quality degradation.

The Sale Preparation Officer identifies unusual landing size restrictions during harvest unit layout. Landing size limitations may come from specialist reports or from field identification during sale layout. There are no known areas where unusually small landings are required on this project. The typical size of a tractor landing will be 1/4 acre or smaller. Most of the landings to be used on this project already exist. Based on specialist reports or recognition of field layout situations some landings will not be reused because of their sensitivity such as adjacency to sensitive areas. In other situations, existing landings may be reused and then ripped or obliterated to reduce future impacts. Again, specialist reports or recommendations are incorporated into these types of decisions as an on-going process.

The Sale Administrator and Purchaser must agree to landings prior to construction. The Sale Administrator may negotiate with the contractor's representative to select mutually acceptable landing locations. Landings must meet the following criteria:

- a. The landing shall not exceed that needed for safe and efficient skidding and loading operations;
- b. Where reasonable choices exist, landing locations are selected which involve the least amount of excavation and least erosion potential;
- c. Landings are usually located near the points of ridges so that felled timber lying between drainages can be skidded to the landing without crossing channels or violating SMZs;
- d. Landings are located where the least number of skid roads are required;
- e. If possible, the skid road approach to the landing would be nearly level;
- f. New landings are designed and constructed as part of specified roads; and
- g. Landing size or equipment restrictions, if any, on the Sale Map are adhered to.

References: Stand Record Cards, Harvest Activity Cards, Sale Area Map. TSC Provisions B6.422, C6.428.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.



### **1.13 Erosion Prevention and Control Measures During Timber Sale Operations**

**Objective:** To ensure that Purchaser's operations shall be conducted reasonably to minimize soil erosion.

The Purchaser is responsible for erosion control work prior to any seasonal period of precipitation or runoff. Equipment shall not be operated when ground conditions are such that excessive damages will result. The Forest Service may temporarily assume responsibility for the work and any unencumbered deposits may be used by the Forest Service to complete the work.

The Sale Administrator, working in conjunction with specialist recommendations, is responsible for determining when the soil surface is unstable and susceptible to damage and is responsible for suspending contract operations.

References: TSC Provisions B4.225, B6.64, B6.65, B6.66, C6.6, C6.601, C6.602, C6.603, Pre-operations meeting checklist and agreements, Timber Sale Prospectus.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

### **1.14 Special Erosion Prevention Measures on Disturbed Land**

**Objective:** To provide appropriate erosion and sedimentation protection for disturbed areas.

The Sale Preparation Officer, using on-the-ground information and specialist recommendations, is responsible for identifying acreage of expected special erosion prevention areas. The acres of seeding and subsoiling are adjusted for each project on the basis of individual watershed concerns. For this project, because of the number of watersheds that are approaching or over the TOC, a considerable number of special erosion prevention measures are proposed. The exact acreage of work needed will be determined after final determination of the selected alternative. Acreage will be based on field inventory, specialist recommendations and aerial photo estimates of number of landings, and miles of skid road or temporary road to be treated. In some instances work will become a sale area improvement project that will be accomplished using funds collected from timber stumpage. Work that is appropriate to include in timber sale contracts will be included as Purchaser responsibility. Native grass seed will be used for revegetation.

The Sale Administrator will designate on-the-ground, using specialist recommendations and/or personal knowledge, the locations for special treatments, and document compliance on a sale inspection form.

References: TSC Provisions B6.6, C6.6, C6.601, C6.602, C6.603, C6.64.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

### **1.15 Revegetation of Areas Disturbed by Harvest Activities**

**Objective:** To establish a vegetative cover on disturbed sites to prevent erosion and sedimentation. Where soil has been severely disturbed by Purchaser's operations and the establishment of vegetation is needed to minimize erosion, the Purchaser shall take appropriate measures to establish an adequate cover that is acceptable to the Forest Service.

The Sale Preparation Officer, using on-the-ground information and specialist recommendations, is responsible for identifying acreage of expected revegetation that will be needed. The acres of seeding and subsoiling is adjusted for each project on the basis of individual watershed concerns. For this project, because of the number of watersheds that are approaching or over the TOC, a considerable amount of special erosion prevention measures are proposed. The exact acreage of work needed will be determined after final determination of selected alternative. Acreage will be based on field inventory, specialist recommendations and aerial photo estimates of number of landings, miles of skid road or temporary road to be treated. The acreage estimates will be included in the timber sale contract for those items which will be Purchaser responsibility. Some work that is not contractually appropriate would be included in the sale area improvement plan and completed by the Forest Service. Work that is considered not appropriate for the Purchaser would include areas that are in need of revegetation, but that are not affected by Purchaser operations. The Timber Sale Administrator will use the contract and specialist reports and recommendations as a guide in determining which areas will be treated. Native grasses suitable to the area will be used.

References: TSC Provisions B6.6, C6.6, C6.601, C6.602, C6.603.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

### **1.16 Log Landing Erosion Prevention and Control**

**Objective:** To reduce impacts of erosion and subsequent sedimentation from log landings by use of mitigating measures.

After landings have served sale needs, the Purchaser is responsible to ditch, rip or slope the landings to permit the drainage, infiltration and dispersion of water. Unless it is otherwise agreed, cut and fill banks around landings shall be sloped to remove overhangs and otherwise minimize erosion. Existing landings that are not used by the Purchaser, that need to be treated, will be treated by the Forest Service using sale area improvement funds collected from timber stumpage.

The Sale Administrator is responsible to insure that these and any other contract provisions for landings are properly implemented on-the-ground, and documents compliance on a sale inspection form.

References: TSC Provisions B6.6, B6.63, B6.422, C6.6, C6.601, C6.602, C6.603, Sale Area Improvement and K-V Collection Plan (prescribes post-sale subsoiling of landings).

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

### **1.17 Erosion Control on Skid Trails**

**Objective:** To protect water quality by minimizing erosion and sedimentation derived from skid trails.

Location of all erosion control measures are designated and agreed to on-the-ground by the Sale Administrator. FSH 2409.23, section 51.64 "Skid Trails and Fire Lines" contains guidelines for spacing of cross drains, construction techniques, and cross drain heights. These guides are used by the Sale Administrator to identify site specific preventative work to be required of the Purchaser. Actual location of water bars, or other skid road erosion treatment methods to be employed, are based upon an on-the-ground determination made before, during and after skid road use. The Sale Administrator will use this EIS, specialist recommendations, reports and the sale administration handbook as a guide in determining types and intensity of treatment methods.

The Purchaser is obligated to complete and maintain erosion control work specified in contract provisions.

References: TSC Provisions B6.422, B6.6, B6.66, C6.6, C6.64, C6.601, C6.602, Sale Administration Handbook, Pre-operations meeting checklist and agreements, Sale Area Improvement and K-V Collection Plan (prescribes subsoiling of skid trails).

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

### **1.18 Meadow Protection During Timber Harvesting**

**Objective:** To avoid damage to the ground cover, soil, and water in meadows.

The Purchaser is required to keep all vehicular or skidding equipment out of meadows designated on Sale Area Maps and/or those marked on-the-ground. Unless otherwise agreed, trees felled into meadows shall be removed by end-lining. Resulting logging slash shall be removed where necessary to protect existing ground cover, soil, and water. Springs associated with meadow-like conditions are similarly protected. This project area contains few meadow or meadow-like riparian areas. There are some springs with meadow-endemic plant associations. There will be no harvest immediately



adjacent to any of these wet areas. Protection zones will be flagged and posted on-the-ground during sale layout using LRMP standards and specialist recommendations as appropriate. All of these areas will be identified on the sale area map to assure protection.

References: Sale Area Map, Stand Record Cards, TSC Provisions B6.422 and B6.61.

Location: Cox Canyon Timber Sale, Boggled Down Insect Salvage, Big Cat Timber Sale, Wrights Helicopter Sale.

### **1.19 Streamcourse Protection**

**Objective:** (1) To protect the natural flow of streams, (2) to provide unobstructed passage of stormflows, (3) to reduce sediment and other pollutants from entering streams, and (4) to restore the natural course of any stream as soon as practical if the stream is diverted as a result of timber management activities.

The Sale Preparation Officer, using field information, topographic maps, specialist recommendations, and LRMP guidelines, identifies streamcourses that are in need of designation on the Sale Area Map. The Sale Administrator works with the Purchaser to insure that Timber Sale Contract clauses, as designated below, are carried out. Hydrologists are available to help with the Sale Administrator's decisions.

- a. Location and method of streamcourse crossings must be agreed to prior to construction;
- b. Purchaser shall repair all damage to a streamcourse, including damage to banks and channel, to the extent practical;
- c. All project debris shall be removed from stream course as soon as practical, but not to exceed 48 hours, in a manner which will cause the least disturbance;
- d. Equipment shall not operate within streamside management zones which are less than 50 feet slope distance from the high water mark, except as necessary for fire suppression activities and at approved crossing(s);
- e. Logs will be end-lined out of streamside areas. Equipment is permitted to enter streamside areas only at locations agreed to by the Sale Administrator and the Purchaser;
- f. Waterbars and other erosion control structures will be located to prevent water and sediment from being channeled into streamcourses, and to dissipate concentrated flows; and
- g. Material from temporary road or skid trail stream crossings is removed and streambanks restored to extent practical.

References: TSC Provisions B6.5, B6.6, C6.5, C6.6.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

## **1.20 Erosion Control Structure Maintenance**

**Objective:** To insure that constructed erosion control structures are stabilized and working.

The Purchaser shall provide maintenance of soil erosion control structures constructed by Purchaser until they have become stabilized but not for more than one year after their construction. Project areas are reviewed by sale administrators to determine effectiveness of erosion work and to identify any additional erosion control structure maintenance that may be needed. Monitoring has shown that if erosion control work is properly done initially, normally no further maintenance is needed. However, there are occasions where structures fail because of quality of installation or unforeseen events, such as unusual storm intensities. In addition, third party damage (such as damage to waterbars by unauthorized four wheel drive use) may cause unexpected failure. The Purchaser is responsible for repair when failure is not associated with third party use. Forest Service assumes responsibility for third party damage.

After one year or for damage caused by third parties, needed erosion control work is accomplished through watershed restoration practices using watershed or sale area improvement funds. The Forest Service may agree to perform Purchaser's maintenance under B4.225 (Cooperative Deposits), if requested and paid for by the Purchaser. If Purchaser fails to do seasonal maintenance work, the Forest Service may assume the responsibility and charge the Purchaser accordingly.

References: TSC Provisions B6.6, B6.66, and B4.225.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

## **1.21 Acceptance of Timber Sale Erosion Control Measures Before Sale Closure**

**Objective:** To assure the adequacy of required erosion control work on timber sales.

The Sale Administrator must inspect and approve or reject Purchaser's final erosion control work as an on-going activity and prior to the project's completion. Unacceptable work must be redone by the Purchaser. Erosion control work is required to be completed within 15 days prior to completion of operations and immediately during wet weather conditions. Acceptance of erosion control work is documented on a sale inspection form for each operating area.

References: TSC Provisions C6.6, B6.6, B6.63, B6.64, B6.65, and B6.66.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

## 1.22 Slash Treatment in Sensitive Areas

**Objective:** To protect water quality by protecting sensitive tributary areas from degradation resulting from use of mechanized equipment for slash disposal.

Sensitive areas, such as streamcourses, are identified on the Sale Area Map by the Sale Preparation Officer using field information, specialist reports and recommendations. Sensitive areas are protected under contract provisions by directional felling away from such areas and by equipment restrictions. Directional felling is required to minimize the amount of slash entering sensitive areas. If slash does enter sensitive areas, it is removed in an agreed upon manner that will cause the least disturbance.

The Sale Administrator is responsible to inspect whether or not the Purchaser has implemented correct and satisfactory slash disposal in all areas.

Reference: TSC Provisions B6.5, B6.61, B6.7, C6.411#, C6.422#, C6.5, C6.62, C6.7, Sale Area Map.

*There were no sensitive, special treatment areas identified on the Whale Rock Project other than meadows and streamcourses, which are discussed elsewhere in this document.*

## 1.24 Non-recurring "C" Provision that can be used for Water Quality Protection

**Objective:** To use the option of inserting Non-recurring "C" provisions into the Timber Sale Contract to protect water quality where standard "B" or "C" provisions do not apply or are inadequate to protect watershed values.

*No Non-recurring "C" provisions specifically for water quality protection have been identified by the IDT or contributing specialists during the preparation of this EIS.* Requirements such as one end suspension, grass seeding, ripping of landings are considered "standard" items in the sense that recurrent "C" provisions require this work. Watershed improvement needs that have been identified will be included as a Purchaser responsibility (such as rocking roads) or as a sale area improvement item that will be accomplished using funds collected from timber stumpage.

Location: Not applicable on this project.

## 1.25 Modification of the Timber Sale Contract

**Objective:** To modify the Timber Sale Contract if new circumstances or conditions indicate that the timber sale will irreversibly damage soil, water or watershed values.

The Forest Service Representative, by agreement with the Purchaser, can agree to modify the contract, or the Chief of the Forest Service may unilaterally modify the contract, suitably compensating the Purchaser, after an Interdisciplinary Team has assessed the



evidence and effects of new concerns that may irreversibly damage soil, water or watershed values. This would result in the revision/supplement of the environmental document for the project.

Reference: TSC provision B8.3 and C8.3.

Location: No sale on Pacific Ranger District has needed a formal modification to protect water quality, reduce soil damage or avoid unacceptable damage to the watershed. Sales have been reviewed by Hydrologists, state water quality experts and other qualified individuals and no significant changes have been identified as necessary on the sales reviewed.

## **2.0 Road Building and Site Construction**

Certain BMPs, such as 2.12 Servicing And Refueling Of Equipment, 2.16 Streamcrossings On Temporary Roads, 2.21 Water Source Development, 2.22 Maintenance Of Roads, 2.24 Traffic Control During Wet Periods, 2.25 Snow Removal Controls and 2.26 Closure Or Obliteration Of Temporary Roads pertain to activities involving timber harvest as well as road construction. The following narrative addresses only those practices that are applicable to the minor road construction proposed for the Whale Rock Project.

### **2.1 General Guidelines for the Location and Design of Roads**

**Objective:** To locate and design roads with minimal resource damage.

The Transportation Planner and Road Designer, in coordination with the ID Team and other specialists, locate the proposed roads to best meet resource objectives. Road reconstruction usually addresses problems associated with control of runoff. Specialist reviews of the Whale Rock project have identified some road drainage concerns. For example, spot rocking and water hole repair are two items associated with the existing roads that are proposed for improvement under all action alternatives for this project. The elimination of some existing roads is also proposed as a watershed improvement item.

References: Environmental Assessment, Transportation Analysis Report, Harvest Activity Cards.

Location: South Rubicon Timber Sale, Boggled Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

### **2.2 Erosion Control Plan**

**Objective:** To limit and mitigate erosion and sedimentation through effective planning prior to initiation of construction activities and through effective contract administration during construction.

Design engineers develop detailed mitigative measures which are incorporated and reflected in the contract's specifications and provisions.

In addition, after award of the contract, the Purchaser (or subcontractor) submits a general plan of operations which includes among other things an erosion control plan. Operations cannot begin until the Forest Service has given written approval of the plan. This Erosion Control Plan incorporates mitigation measures set forth in the contract.

References: Environmental Assessment, Transportation Analysis Report, Harvest Activity Cards, TSC Provisions B6.31, C6.3, Pre-operations meeting notes and Erosion Control Plan developed at that meeting, Road Plans.

Location: South Rubicon Timber Sale, Bogged Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

### **2.3 Timing of Construction Activities**

**Objective:** To minimize erosion by conducting operations during minimal runoff periods.

Normal Operating Periods are identified in the contract. Operations can only be conducted when excessive erosion will not occur. The Sale Administrator working with other resource specialists would make the determination of acceptable risk of erosion problems. The Engineering Representative, Engineering Inspector, Forest Service Representative, and Sale Administrator ensure contract compliance, which includes design specification compliance, during project implementation. The Purchaser or operator implement the contract design on-the-ground.

References: TSC Provisions B6.5, B6.6, C6.311, Standard Specifications 100.42, EIS, Transportation Analysis Report, Harvest Activity Cards, Road Plans.

Location: South Rubicon Timber Sale, Bogged Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

### **2.4 Road Slope Stabilization (Preventative Practice)**

**Objective:** To improve road cut and fill slope stabilization by applying mechanical and vegetative measures.

During the preparation of the contract road plans, the Transportation Planner and Designer, using specialist recommendations contained in their reports and this EIS will identify areas that will require slope stabilization. The needed requirements will become part of the timber sale contract and implementation would be during the construction/reconstruction phase of the timber sale contract. Work that is not an appropriate contractual item, such as stabilization of roads not used by the Purchaser, will be

included as a sale improvement activity and completed by the Forest Service using funds collected from timber sale receipts.

References: EIS, Transportation Analysis Report, Harvest Activity Cards, Road Plans.

Location: South Rubicon Timber Sale, Bugged Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## **2.5 Road Slope Stabilization (Administrative Practice)**

**Objective:** To reduce sedimentation by minimizing erosion from road slopes and minimizing the chances for slope failures along roads.

During development of this EIS, the appropriate specialists have discussed and identified both specific and general concerns that are associated with the various alternatives. The fact that the action alternatives include proposals that will increase potential for direct, indirect and cumulative watershed effects has been noted. The IDT has incorporated recommendations from the various specialists as mitigation actions that will serve to reduce adverse project effects. Some of the mitigations would occur as a contract requirement, some as a post-project activity. These actions have identified and developed the necessary mitigation measures to minimize erosion.

The Engineering Representative and/or Sale Administration team will insure that contract specifications for erosion prevention and control are implemented in a timely manner (i.e., immediately after construction is completed and prior to the first winter season).

References: EIS, Transportation Analysis Report, Harvest Activity Cards, Road Plans. Standard Specification 625.03 and 203.10.

Location: South Rubicon Timber Sale, Bugged Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## **2.6 Dispersion of Subsurface Drainage From Cut and Fill Slopes**

**Objective:** To minimize the possibilities of cut or fill slope failure and the subsequent production of sediment.

Design Engineers in coordination with the Geologist, Transportation Planner, Soil Scientist, and Hydrologist determine detailed mitigation measures for inclusion in the road design package and the environmental document. Some of this work can be done in a general way prior to the staking and design of a road; some of the work must wait until the road design is complete. Using on-the-ground conditions, evidence of subsurface water will initiate engineering solutions to potential problems. Wet ground conditions that surface during construction are remedied by design changes that will correct the unforeseen problem.



The contract preparer is responsible for seeing that the Design Engineer has included the recommended mitigation measures in the road package.

The Engineering Representative, Engineering Inspector, Forest Service Representative, and Sale Administrator are responsible for implementation and compliance of the design specifications.

References: EIS, Transportation Analysis Report, Harvest Activity Cards, Road Plans.

Location: South Rubicon Timber Sale, Boggled Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## **2.7 Control of Road Drainage**

**Objective:** To minimize the erosive effects of water concentrated by road drainage features and disperse runoff from disturbances within the road clearing limits.

Field reviews by road designers and earth science specialists locate existing and potential problems. Identified problems are corrected by proper engineering. The use of riprap, installation of ditches, culverts and road rock are common corrective measures employed. On this project, all of the above measures have been identified for specific corrections. This work will lessen the sediment load from roaded areas and minimize erosion of the road prism by runoff from road surfaces and from uphill areas.

References: EIS, Transportation Analysis Report, Harvest Activity Cards, Road Plans, C5.4.

Location: South Rubicon Timber Sale, Boggled Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## **2.8 Constraints Related to Pioneer Road Construction**

**Objective:** To minimize sediment production and mass wasting problems associated with pioneer road construction.

Field reviews by road designers and earth science specialists locate potential problems associated with pioneer road construction. Where sensitive areas are present restrictions are placed upon approval of pioneer construction. For this project, it is not expected that pioneer construction will cause any problems since new roads are not located in sensitive areas.

References: TSC Provision B6.65, Road Plans.

Location: South Rubicon Timber Sale, Boggled Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## **2.9 Timely Erosion Control Measures on Incomplete Roads and Streamcrossing Projects**

**Objective:** To minimize erosion of and sedimentation from disturbed ground on incomplete projects.

The Engineering Representative and/or Forest Service Representative must insure that the Purchaser has met contractual obligations related to the implementation of erosion prevention and control measures on incomplete road segments prior to operations ending for the season.

When conditions permit operations outside the Normal Operating Season, the Engineering Representative and/or Forest Service Representative must insure that the Purchaser's erosion control measures are current with ground disturbance to quickly and effectively close the area if weather conditions deteriorate.

References: TSC Provisions B6.6, B6.65, B6.66.

Location: South Rubicon Timber Sale, Bogged Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## **2.10 Construction of Stable Embankments (Fills)**

**Objective:** To construct embankments with materials and methods which minimize the possibility of failure and subsequent water quality degradation.

Field reviews by road designers and earth science specialists locate existing and potential fill related problems. For this project, it is not expected that fill construction will cause any problems. This is because the location of new roads will result in minimal fill sizes. Fills over 3 feet in height will be rare and where they do occur they will not be in sensitive areas and will be grass seeded. There are no identified locations where existing fill failures are causing watershed problems.

References: Standard Specification 203.04, 201.03, 201.13, Road Plans.

Location: South Rubicon Timber Sale, Bogged Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## **2.11 Minimization of Sidecast Material**

**Objective:** To minimize sediment production originating from material sidecast during road construction or maintenance.

Design Engineers, in coordination with the Soil Scientist and Hydrologist, determine detailed mitigation measures for inclusion in the road design package and the

environmental document. For this project, it is not expected that sidecast material will cause any problems because the location of new roads will result in minimal fill sizes.

The Engineering Representative, Engineering Inspector, Forest Service Representative, and Sale Administrator are responsible for implementation and compliance of the design specifications. The Purchaser or operator implements the design specifications on-the-ground.

References: Environmental Assessment, Transportation Analysis Report, Harvest Activity Cards, Road Plans.

Location: South Rubicon Timber Sale, Bogged Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## **2.12 Servicing and Refueling of Equipment**

**Objective:** To prevent pollutants such as fuels, lubricants, bitumens, raw sewage, wash water and other harmful materials from being discharged into or near rivers, streams and impoundments or into natural or man-made channels leading thereto.

The Purchaser is required to take appropriate preventative measures to insure that the spill of oil products does not enter any stream course. An engineer certified spill plan must be submitted if oil product storage exceeds 1320 gallons or if any single container capacity exceeds 660 gallons.

References: TSC Provision B6.34 and Spill Prevention Plan developed during the Pre-operations meeting.

Location: South Rubicon Timber Sale, Bogged Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## **2.13 Control of Construction in Streamside Management Zones (Buffer Strips)**

**Objective:** To designate a zone along streams, which will reduce adverse effects of nearby roads by:

1. Acting as an effective filter for sediment generated by erosion from road fills, dust drift, and oil traces;
2. Maintaining shade, riparian habitat (aquatic and terrestrial) and channel stabilizing effects; and
3. Keeping the floodplain surface in a resistant, undisturbed condition to limit erosion by flood flows.



Design Engineers in coordination with the Soil Scientist and Hydrologist determine detailed mitigation measures for inclusion in the road design package and the environmental document. For this project, it is not expected that construction in streamside zones will cause any problems. This is because the location of new roads will result in the crossing of only Class IV drainages that will be dry during the period of construction. Fill slopes at these crossings will be stabilized, sidecast material will be minimized and the crossings will be rocked. The roads will also be the minimum needed for a log truck or chip van, thus road widths will be minimized.

The Engineering Representative, Engineering Inspector, Forest Service Representative, and Sale Administrator are responsible for implementation and compliance of the design specifications. The Purchaser or operator implements the design specifications on-the-ground.

References: EIS, Transportation Analysis Report, Harvest Activity Cards, Road Plans, TSC Provisions B6.5, C6.5.

Location: South Rubicon Timber Sale, Boggled Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

#### **2.14 Controlling In-channel Excavation**

**Objective:** To minimize stream channel disturbances and related sediment production.

The Transportation Planner, Timber Sale Preparation Officer and Design Engineer review proposed road construction to identify any live streamcourses requiring the installation of culverts and develop the necessary mitigation to minimize disturbance to the stream channel. There are no live drainages proposed for new road crossings on this project. Some reconstruction is planned to install culverts in streams that are currently without culverts.

The Engineering Representative and/or Forest Service Representative will insure that stream channel disturbances are minimized through implementation of applicable contractual provisions and design drawings.

References: EIS, Transportation Analysis Report, Harvest Activity Cards, Road Plans, TSC Provisions B6.5, C6.5.

Location: South Rubicon Timber Sale, Boggled Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

#### **2.15 Diversion of Flows Around Construction Sites**

**Objective:** To insure that all stream diversions are carefully planned to minimize downstream sedimentation and to restore stream channels to their natural grade, condition and alignment as soon as possible.

The Transportation Planner, Timber Sale Preparation Officer, and Design Engineer identify any live streamcourses requiring diversions and develop the necessary mitigation to minimize disturbance to the stream channel, downstream sedimentation and necessary measures for channel restoration. *There are no such live streamcourses requiring diversions on this project.*

The Engineering Representative and/or Forest Service Representative would insure that stream channel disturbances are minimized through implementation of applicable contractual provisions and design drawings, if needed.

References: Environmental Assessment, Transportation Analysis Report, Harvest Activity Cards, Road Plans, TSC Provision B6.5, C6.5.

Location: South Rubicon Timber Sale, Bogged Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## **2.16 Streamcrossings on Temporary Roads**

**Objective:** To insure that temporary roads do not unduly damage streams or disturb channels so that fish passage is unimpeded by streamcrossing structures.

The Sale Administrator will identify location and mitigative measures for streamcrossings on temporary roads in consultation with a Hydrologist and Engineer if necessary. On this project it is not expected that there will be any streamcrossings affected by temporary roads.

The Purchaser would construct stream crossings in compliance with the specialist's recommendations and the sale administration direction if such crossing needs were encountered.

References: TSC Provisions B6.5, B6.65, C5.122, C6.5, C6.621.

Location: Big Cat Timber Sale, Two Peaks Timber Sale, Wrights Timber Sale.

## **2.17 Bridge and Culvert Installation (Disposition of Spoil Materials and Protection of Fisheries)**

**Objective:** To minimize sedimentation and turbidity resulting from excavation for in-channel structures.

The Transportation Planner, Timber Sale Preparation Officer, Hydrologist, and Design Engineer would identify, in the planning stage, any live streamcourses requiring the installation of hardware (culverts) and would develop the necessary mitigation to minimize disturbance to the stream channel and resultant sedimentation. *For this project, there are no live stream crossings planned.*

The Engineering Representative and/or Forest Service Representative would insure that stream channel disturbances are minimized through implementation of applicable contractual provisions and design drawings.

References: Environmental Assessment, Transportation Analysis Report, Harvest Activity Cards, Road Plans, Design Standard Specifications.

Location: South Rubicon Timber Sale, Boggled Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## **2.18 Regulation of Streamside Gravel Borrow Areas**

**Objective:** To limit channel disturbances and sediment production associated with gravel source development.

Normally, during project analysis and preparation for the environmental document, the Interdisciplinary Team, specifically the Hydrologist, Soil Scientist, Transportation Planner, and Design Engineer, identify areas where rock or gravel would come from streamsidess. *For this project, no such proposal was a part of project design, thus no review was needed.* Coordination would be done with the California Department of Fish and Game. Mitigation measures would be identified in the environmental document.

The Engineering Representative, Engineering Inspector, Forest Service Representative, and Sale Administrator would insure contract compliance, which includes design specification compliance, during project implementation. The Purchaser or operator implement the contract design on-the-ground.

References: *No Streamside gravel pits are proposed for this project.* Environmental Assessment, Transportation Analysis Report, Harvest Activity Cards, Road Plans.

Location: Not applicable on this sale.

## **2.19 Disposal of Right-of-Way and Roadside Debris**

**Objective:** To insure that debris generated during road construction is kept out of streams and to prevent slash and debris from subsequently obstructing channels, and to insure that debris dams are not formed which obstruct fish passage or which could result in downstream damage from high water flow surges after dam failure.

The Engineering Representative and/or Forest Service Representative will insure that road construction debris does not enter the streamcourse channel through implementation of applicable contractual provisions.

References: Environmental Assessment, Transportation Analysis Report, Harvest Activity Cards, Road Plans, Road Specifications 201.06 and 201.03.



Location: South Rubicon Timber Sale, Bogged Down Insect Salvage Timber Sale, Icehouse Timber Sale, Black Flag Insect Salvage Sale, South Silver Timber Sale.

## 2.20 Specifying Riprap Composition

**Objective:** To minimize sediment production associated with the installation and utilization of riprap material.

During project road design, the Hydrologist, Soil Scientist, Fisheries Biologist, and Design Engineers will identify areas where streambank or ditchline stabilization is needed using riprap. These areas and mitigation measures will be site-specifically identified after the preferred alternative is selected. For this project, because of the lack of stream crossings and minor amounts of new road construction, the amount of riprap needed will be very small. Existing roads will have some minor riprap installations where some unacceptable levels of erosion are evident.

The Engineering Representative, Engineering Inspector, Forest Service Representative, and Sale Administrator are responsible for contract and design compliance on-the-ground. The Purchaser or operator implement the contract design on-the-ground.

References: Environmental Assessment, Transportation Analysis Report, Harvest Activity Cards, Road Plans, Standard Specification 619.

Location: South Rubicon, Bogged Down, Peavine Timber Sales.

## 2.21 Water Source Development Consistent With Water Quality Protection

**Objective:** To supply water for roads and fire protection while maintaining existing water quality.

The Transportation Planner, Design Engineer, and Sale Administrator work with the Hydrologist and Fisheries Biologist to locate and design water sources. *On this project no new water sources are proposed.* Established water fill sources will be reused with the reconstruction of the existing water fill in Little Soldier Creek proposed. An off-channel water fill location has previously been constructed in Soldier Creek.

The Engineering Representative, Engineering Inspector, Forest Service Representative, and Sale Administrator are responsible for contract and design compliance on-the-ground. The Purchaser or operator implement the contract design on-the-ground.

References: Transportation Analysis Report, Harvest Activity Cards, Road Plans, TSC Provisions C5.421.

Location: Black Flag Timber Sale, Cold Springs Timber Sale.

## 2.22 Maintenance of Roads

**Objective:** To maintain roads in a manner which provides for water quality protection by minimizing rutting, failures, sidecasting and blockage of drainage facilities (all of which can cause sedimentation and erosion).

A general Road Maintenance Plan is provided by a Forest Engineer for inclusion in the Timber Sale Contract. This plan includes the construction of structural water bars and surface blading for all native surface roads which are used by the Purchaser.

A specific Road Maintenance Plan is agreed to between the Forest Service Representative and the Purchaser at the Pre-operations meeting. The Road Maintenance Engineer and Sale Administrator are responsible for inspecting and approving road maintenance work performed by the Purchaser commensurate with his use.

References: TSC Provisions B5.4 and C5.4 and the Road Maintenance Plan/Schedule developed during the Pre-operations meeting; Prospectus.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

## 2.23 Road Surface Treatment to Prevent Loss of Materials

**Objective:** To minimize the erosion of road surface materials and consequently reduce the likelihood of sediment production from those areas.

During project analysis and preparation of the environmental document the Interdisciplinary Team, specifically the Soil Scientist, Transportation Planner, and Design Engineers identify areas where road surface treatment is needed to prevent loss of materials. Hydrologist recommendations are also used. These areas and mitigation measures are identified in the environmental document and/or the Transportation Analysis Report. Rocking of a road in the Soldier Creek Watershed is being proposed to specifically deal with sediment into Soldier Creek. Other smaller spot rocking will occur on a site specific basis where loss of native surface materials is occurring.

The Engineering Representative, Engineering Inspector, Forest Service Representative, and Sale Administrator are responsible for contract and design compliance on-the-ground. The Purchaser or operator implement the contractual requirements on-the-ground.

References: TSC Provision C5.411 (Dust Abatement), Transportation Analysis Report.

Location: Wench Timber Sale, East Union Timber Sale, Big Cat Timber Sale.

## 2.24 Traffic Control During Wet Periods

**Objective:** To reduce road surface disturbance and rutting of roads.

The District Transportation Representative will insure that road closures and traffic control measures are used on roads outside the project area during wet periods where continued traffic would cause excessive erosion and damage to road surfaces. This is to decrease sediment washing from road surfaces.

The Sale Administrator and Road Maintenance Engineer inspect road conditions on a regular basis and insure that log hauling and other timber sale traffic is appropriately restricted during wet periods.

References: TSC Provisions B5.12, B6.22, C5.12, C5.4.

Location: In Living Color Insect Salvage Timber Sale.

## **2.25 Snow Removal Controls to Avoid Resource Damage**

**Objective:** To minimize the impact of melt water on road surfaces and embankments and to consequently reduce the probability of sediment production resulting from snow removal operations.

The Sale Administrator, in conjunction with the Road Maintenance Engineer, insures that the Purchaser's snow removal is done in a manner that will protect roads and adjacent resources.

References: TSC Provisions C5.414, Standard Specification 203.09.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

## **2.26 Closure or Obliteration of Temporary Roads**

**Objective:** To reduce road surface disturbance and sediment generated from roads that are not routinely maintained and limit the mileage of roads actually in use on National Forests, along with their potential for erosion and sedimentation.

Only very minor temporary road use will occur on this project. Several existing temporary roads that have been used regularly for several years will be upgraded to permanent roads in order to provide adequate drainage control and surface protection. The Sale Administrator is responsible for assuring that the temporary roads planned for this project are effectively drained and stabilized following use. There are no temporary roads that are expected to have any post-sale activities, such as firewood removal by the public. Some existing temporary roads will be obliterated as part of this project. Obliteration has been recommended by hydrologists and will be accomplished by subsoiling the temporary roads as part of the post-sale activities.

The Purchaser is responsible for adequate drainage and stabilization of temporary roads. The Sale Administrator inspects and approves this work.



References: Harvest Activity Cards, Sale Area Improvement and KV Collection Plan, specialist reports. TSC Provisions B6.62, C6.603, C6.621.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

## **2.27 Restoration of Borrow Pits and Quarries**

**Objective:** To minimize sediment production from borrow pits and quarry sites.

*There are no borrow pit needs for this project.* If there were, the Transportation Planner, Soil Scientist, Hydrologist (if necessary), Geologist, and Design Engineer would identify areas that would be used as borrow pits and/or quarries during project analysis and preparation of the environmental document. Mitigation measures addressing size of borrow pit, quantity of material to be removed, what to do with oversize material after excavation, reshaping, sloping, erosion control, and possible revegetation of the site would be identified in the environmental document and the Transportation Analysis Report.

The Design Engineer would insure that the mitigation measures are incorporated into the road design specifications package and that the borrow pit is identified on the Sale Area Map (if possible).

The Engineering Representative, Engineering Inspector, Forest Service Representative, and Sale Administrator are responsible for contract and design compliance on-the-ground. The Purchaser or operator implement the contractual requirements on-the-ground.

Reference: *No borrow pit construction is proposed for this project.*

Location: Not applicable in this project.

## **5.0 Vegetative Manipulation**

The BMPs identified under this heading for this project refer to post-sale activities designed to reforest areas that are understocked or areas in need of vegetative manipulation to increase tree growth or fuels reduction. Since immediately connected activities for this project are limited to fuels reduction via use of tractors or prescribed burning, only BMPs related to these two activities are discussed here. The use of tractors and prescribed burning has been recognized in the CWE analysis that was completed for this project.

*There are no activities proposed that involve the use of herbicides at this time.* Should any needs be identified in the future, an environmental assessment would be prepared for that activity. In addition, mechanical treatments for release, such as hand grubbing,

discing, scalping, etc., will also be similarly addressed in a post-sale environmental assessment. The post-sale environmental assessment would identify, in a fashion similar to this document, those BMPs that are pertinent to the activity being proposed.

## **5.2 Slope Limitation for Tractor Operation**

**Objective:** To reduce gully and sheet erosion and associated sediment production by limiting tractor use on steep slopes.

Post-sale fuels reduction using tractors will be limited to the same slope limitation used in the identification of potential harvest units, i.e., equipment will be limited to slopes less than 35%. Fuels reduction work will be done by the Forest Service, therefore the responsibility for implementing this requirement will be with the Fuels Management Specialist and the District Ranger Team.

Reference: Environmental Assessment, Site Preparation Contracts (provisions from contracts are also applied to force account site preparation work), Harvest Activity Cards, Stand Record Cards, Sale Area Improvement and K-V Collection Plan.

Location: Big Cat Timber Sale, Cox Canyon Timber Sale, Wench Timber Sale, East Union Timber Sale, Black Flag Insect Salvage Timber Sale.

## **5.3 Tractor Operation Excluded from Wetlands and Meadows**

**Objective:** To limit turbidity and sediment production resulting from compaction, rutting, runoff concentration, and subsequent erosion.

Fuels reduction will not be done in wetlands or within the meadow edges. Fuels reduction work will be done by Forest Service, therefore the responsibility for implementing this requirement will be with the Fuels Management Specialist and the District Ranger Team.

Reference: Sale Area Map, EIS, Wildlife Biology maps available on District displaying springs and meadows.

Location: Big Cat Timber Sale, Wench Timber Sale, Black Flag Insect Salvage Timber Sale.

## **5.6 Soil Moisture Limitations for Tractor Operation**

**Objective:** The objective of this measure is to prevent compaction, rutting, and gullyng with resultant sediment production and turbidity.

Tractor piling will not be done when ground conditions are such that damage to the resources will occur.

Fuels reduction work will be done by the Forest Service, therefore the responsibility for implementing this requirement will be with the Fuels Management Specialist and the District Ranger Team. Specialists will be consulted as appropriate.

Reference: EIS.

Location: Wench Timber Sale.

### **5.7 Contour Disking**

**Objective:** To reduce erosion and associated sediment production by preventing water concentration on disturbed sites.

Disking is planned on ridgetop fuelbreaks only. No contour disking is needed or planned.

Reference: EIS.

Location: Not applicable in this project.

## **6.0 Fire Suppression and Fuels Management**

In addition to the work identified above, post-sale fuel treatment plans for this sale include broadcast understory burning in selected units and the burning of hand piles and landing piles. Since major post-project fuels work is necessary, the applicable BMPs are referenced herein.

### **6.1 Fire and Fuels Management Activities**

**Objective:** One of the objectives of fire management is to reduce public and private losses which result from wildfires and/or subsequent flooding and erosion, by reducing the frequency, intensity and destructiveness of wildfire.

In the preparation of this document a Fuels Management Specialist participated as part of the Interdisciplinary Team. The fuels evaluation is provided in this report.

Location: Silver Cable Buyout Timber Sale, Wench Timber Sale, East Union Timber Sale.

### **6.2 Consideration of Water Quality in Formulating Fire Prescriptions**

**Objective:** To provide for water quality protection while achieving the management objectives of prescribed fire.

A Fuels Management Specialist will provide a project prescription for this area based on a field review following proposed project activity which will identify optimum and tolerable limits of fuels for water quality protection.



Location: Silver Cable Buyout Timber Sale, Wench Timber Sale, Big Cat Timber Sale, Cox Canyon Timber Sale.

### **6.3 Protection of Water Quality From Prescribed Burning Effects**

**Objective:** To maintain soil productivity, minimize erosion, and prevent ash, sediment, nutrients, and debris from entering water bodies.

The Forest Service and/or other crews will prepare units for prescribed burning. This includes waterbarring firelines and reducing fuel concentrations. This measure is to maintain soil productivity, minimize erosion and prevent sediment, ash, nutrients, and debris from entering water bodies.

Reference: Fuels Treatment Plan, Sale Area Improvement and KV Collection Plan.

A considerable amount of prescribed understory burning has been conducted on Pacific District in the general area of the Whale Rock project. Based upon this experience, the effects upon the local environment can be quite confidently predicted, including effects upon water quality.

Location: Cleveland Corral Broadcast Burn, Rice Cabin Broadcast Burn, Peavine Natural Area Broadcast Burn.

### **7.1 Watershed Restoration**

**Objective:** To improve water quality and soil stability.

Watershed Improvement Need projects (WIN) have been identified and are incorporated into the Whale Rock project. Most of this work has been identified by forest hydrologists or foresters. Some work will be completed by timber sale Purchasers and this has been previously discussed. Some work will be completed with Forest Service crews using funds collected from timber receipts from the Whale Rock project or previously completed timber sales. These measures are to improve water quality and soil stability.

Reference: Watershed improvement needs have been identified for several areas in the project area.

Location: Girard Creek Watershed, Black Flag Timber Sale.

### **7.3 Protection of Wetlands**

**Objective:** To avoid adverse water quality impacts associated with the destruction or modification of wetlands.

Reference: No wetlands occur in this project area. Springs, seeps and riparian areas will be protected by avoidance.

Location: Black Flag Insect Salvage, Bogged Down Insect Salvage, Peavine Timber Sale.

#### **7.4 Oil and Hazardous Substance Spill Contingency Plan**

**Objective:** To minimize contamination of waters from accidental spills.

An Emergency Spill Coordinator is available on forest in the event of a hazardous spill. This is to minimize contamination of waters from accidental spills.

The Purchaser and Forest Service are required to take appropriate preventative measures to ensure that the spill of oil products does not enter any stream course. An engineer certified spill plan must be submitted if oil product storage exceeds 1320 gallons or if any single container capacity exceeds 660 gallons.

Reference: Pre-operations meeting checklist, TSC Provision C6.341.

Location: Wench Timber Sale, Black Flag Timber Sale, East Union Timber Sale.

#### **7.7 Management by Closure of Use (Seasonal, Temporary, and Permanent)**

**Objective:** To exclude activities that could result in damages to either resources or facilities resulting in impaired water quality.

This project area has existing gates at key locations for controlling use of native surfaced roads. The District Law Enforcement Officer and Road Maintenance Engineer are responsible for ensuring that seasonal control restrictions are monitored and enforced.

Seasonally, the District Ranger Team closes all native surfaced roads to public use by implementing a Forest Road Closure Order.

Reference: Transportation Analysis Report, Environmental Assessment, TSC Provision C5.4 and Road Maintenance Plan.

Location: Numerous roads are gated throughout the District and all are subject to seasonal closures for road and watershed protection needs.

*Please use this page for notes.*



**APPENDIX B**

**BIOLOGICAL EVALUATION FOR WILDLIFE SPECIES**

**AND**

**MANAGEMENT INDICATOR SPECIES ANALYSIS**

**FOR THE WHALE ROCK PROJECT AREA**

ELDORADO NATIONAL FOREST

PACIFIC RANGER DISTRICT

*Please use this page for notes.*

**U. S. DEPARTMENT OF AGRICULTURE**

**FOREST SERVICE**

**ELDORADO NATIONAL FOREST**

**PACIFIC RANGER DISTRICT**

**BIOLOGICAL EVALUATION FOR WILDLIFE SPECIES**

**FOR**

**WHALE ROCK MULTI-RESOURCE FOREST HEALTH PROJECT  
DRAFT ENVIRONMENTAL IMPACT STATEMENT**

**CY 1996**

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## I. INTRODUCTION

The Forest Service Manual (FSM) 2670.3 directs that biological evaluations be prepared to evaluate project effects upon Federally proposed, threatened, or endangered species, and Region 5 designated sensitive species to ensure that project decisions do not adversely affect Federally listed species or result in the loss of species viability or create significant trends towards Federal listing for sensitive species. A species list for information on threatened, endangered or proposed listed wildlife species that could occur within the project area was requested from the U.S. Fish and Wildlife Service pursuant to Section 7 (c) of the Endangered Species Act. The agency responded on **January 18, 1996** and listed bald eagle, peregrine falcon, Delta smelt, valley elderberry longhorn beetle, Sacramento splittail and red-legged frog as listed species that could occur in the area (**Case No. 1-1-96-SP-0291; USDI 1996**). This biological evaluation considers the potential effects of the proposed Whale Rock Multi-Resource Forest Health Project on the following species:

- 1) Federally listed endangered species (USDI Fish and Wildlife Service 1996): American peregrine falcon (Falco peregrinus);
- 2) Federally listed threatened species (USDI Fish and Wildlife Service 1996): bald eagle (Haliaeetus leucocephalus) Delta smelt (Hypomesus transpacificus) and valley elderberry longhorn beetle (Desmocerus californicus dimorphus);
- 3) Federally proposed species (USDI Fish and Wildlife Service 1996): California red-legged frog (Rana aurora draytoni) and Sacramento splittail (Pogonichthys macrolepidotus).
- 4) Region 5 designated sensitive species (FSM 2672): California spotted owl (Strix occidentalis occidentalis), northern goshawk (Accipiter gentilis), Sierra Nevada red fox (Vulpes vulpes necator), fisher (Martes pennanti), marten (Martes americana), great gray owl (Strix nebulosa), willow flycatcher (Empidonax traillii), and northwestern pond turtle (Clemmys marmorata marmorata).

Of the species considered, only the California red-legged frog, valley elderberry longhorn beetle, northwestern pond turtle, California spotted owl, northern goshawk and fisher will be analyzed in detail in the remainder of this document (USDA 1995a). A brief rationale for not further considering the other species follows:

*Peregrine falcon* - There are no verified sightings of peregrine falcon on the Pacific Ranger District, although a few potential sightings have been reported within recent years in the Wrights Lake area. Cliff sites occur scattered across the district but these sites were judged to be unsuitable (Wilderness Research Institute 1980). There are no potential cliff sites within one mile of

the project. This project will not affect potential nesting cliff sites and will not affect any known or suspected nest sites.

*Bald eagle* - On the Eldorado National Forest, bald eagle habitat is identified as those areas within one mile and in view of large water bodies. The project area is six miles from the nearest nest. The major drainages of the S. Fork of the American River and Silver Creek form the south, west and north borders of the project area. However, due to the lack of a significant prey base, these drainages are considered marginal foraging habitat and unsuitable nesting habitat for bald eagles.

*Delta smelt and Sacramento splittail* - The minimal amount of silt that may be generated as a result of this project will be trapped behind dams along the American River and will not affect the off site occurrence of these species.

*Great gray owl and willow flycatcher* - There are no verified sightings of these species on the Pacific Ranger District. This project does not include the meadow or riparian habitats required by these species.

*Marten and Sierra Nevada red fox* - There are no verified sightings of these species in the vicinity of the project area. There was a possible sighting of a marten approximately 3.5 miles away in 1990 along Highway 50. Based upon the location and habitat, it is likely that this sighting was of a mink rather than a marten. The project area would be at the lower elevation range for marten as reported in the literature for the northern Sierra; however, they are not expected to occur within the project area. The project area is well below the reported elevation range for Sierra Nevada red fox.

## II. CURRENT SPECIES MANAGEMENT DIRECTION

In 1989, the Eldorado National Forest completed its Land and Resource Management Plan (LRMP). Management Practice 48 (pages 4-47 and 4-48) of the LRMP directs the Forest to use administrative measures to protect and improve habitat for proposed, threatened, endangered, and sensitive species and to prepare local management plans to meet recovery objectives for Federally listed species. The LRMP designates individual management areas and special management prescriptions for California spotted owl and northern goshawk. A draft management plan has been prepared for the bald eagle within the Crystal Basin (USDA 1993d). No special management prescriptions were developed for the remaining species.



### **California Red-legged Frog, Northwestern Pond Turtle and Valley Elderberry Longhorn Beetle**

The LRMP does not provide specific guidelines for the management of the red-legged frog, northwestern pond turtle or valley elderberry longhorn beetle. However, the LRMP does provide specific management prescriptions for streamside management zones (LRMP, Management Area 30) and riparian areas (LRMP, MA 28).

### **California Spotted Owl**

The LRMP designated a network of 32 Spotted Owl Habitat Areas (SOHAs) to be managed to provide suitable habitat for reproductive pairs of owls to ensure a viable population of spotted owls on the Forest. Each SOHA contained 1,000 acres of suitable "base" habitat with an additional 650 acres of "replacement" habitat. Currently 27 SOHAs contain at least one reproductive pair. There are six SOHAs located on the Pacific Ranger District.

In July of 1992, the California Spotted Owl Technical Assessment Team released its findings on the status of the California spotted owl with recommendations for interim management (Verner et al., 1992; also called the CASPO Report). These new guidelines address timber and fuels management projects through retention standards for large trees, snags, and logs in all suitable and potential owl habitat (select and other strata). They change SOHA management to focus on the 1,000 acres of base habitat. In addition, they provide for protection of a 300-acre "protected activity center" (PAC) surrounding owl nest/roost stands. The activity centers were determined by using owl locations listed in the California Department of Fish and Game database. Aerial photos were then used to draw preliminary boundaries around the owl activity centers. These boundaries then need to be field verified to assure the best available suitable habitat is protected (USDA 1993b). These recommendations were essentially adopted in January of 1993 in a regional Environmental Assessment for the California Spotted Owl Sierran Province Interim Guidelines (USDA 1993a).

On February 3, 1995, Region 5 released a Draft Environmental Impact Statement (DEIS) entitled "Managing California Spotted Owl Habitat in the Sierra Nevada Forests of California, an Ecosystem Approach" (USDA 1995b). The purpose of this DEIS is to analyze and adopt a longer term strategy to maintain spotted owl viability than was recommended under the CASPO Interim Guidelines. The preferred alternative, Alternative C, proposes that the landscape be managed based on three general zones of management intensity. The alternative was designed to provide for sustainable wildlife habitat through the restoration of forest health and by the protection of riparian areas. Ridgetops would be managed as fuelbreaks with the lowest levels of snags and logs and a canopy closure of less than 40%. Riparian zones would be managed to retain late seral characteristics with little or no management activities. The mid-slope would be managed to provide foraging habitat for late successional species while still reducing the risk of catastrophic fire. A Final EIS is expected to be completed by the spring of 1996.



### **Northern Goshawk**

The LRMP designates a network of 51 Goshawk Management Areas (GMAs) that are managed to provide suitable habitat to ensure a viable population of goshawks exists on the Forest. The GMAs are divided into primary and alternate nest stands consisting of approximately 25 acres each for a total of 50 acres for each territory. Recent information indicates that nesting goshawk pairs require a minimum of 120 acres for a successful nest stand (Fowler 1988; Woodbridge 1988).

The GMAs were designed based upon a forest-wide survey conducted in 1983. Surveys to verify occupancy of these territories on the Pacific Ranger District were initiated in 1992, with most sites needing additional survey to meet current survey protocols. There are 32 known active goshawk territories on the Forest, 11 of them in GMAs originally identified in the LRMP. The Pacific Ranger District currently has 10 GMAs. The Forest is currently updating its goshawk territory network to incorporate new active stands.

### **Fisher**

The LRMP does not provide specific guidelines for the management of fisher. This species is associated with late seral stage forests. The distribution of this species on the Forest is not known as there are few recent reported sightings and no verified sightings. Forest wide Standards and Guidelines were expected to provide habitat to support viable populations of these species (LRMP, page 2-15).

Habitat guidelines for the fisher have been developed based on a literature review (Freel, 1991). Using these guidelines, the Eldorado National Forest prepared a report (Evaluation of Habitat Requirements for Fisher on the Eldorado National Forest, 1994) identifying a draft network of potential Fisher Use Areas and Wildlife Movement Corridors (USDA 1994).

## **III. DESCRIPTION OF PROJECT**

The Whale Rock project area includes all Forest Service land west of the Cleveland Fire area (see Figure 1, pp. I-2 in DEIS). It is bound on the south by the South Fork of the American River and on the west and north by Silver Creek. All action alternatives involve a two phase process in order to reduce the risk of catastrophic wildfire and to improve forest health. In Alternatives B-E, the first phase involves the thinning of stands through timber harvest operations, and the second phase involves a large-scale prescribed burn program to reduce fuel loading. These alternatives have the same general treatment prescriptions but vary in the amount and area for these treatments (See Table 2 in the DEIS for summary). Each action alternative also involves some level of road construction and reconstruction. Alternatives B and E also propose to build shaded fuelbreaks on major ridgetops throughout the project area. All action alternatives comply with the CASPO Interim guidelines for snag and down log levels. Alternative C proposes

an adaptive management strategy for mechanical thinning within PACs. In addition, all alternatives include the deletion of PAC ED-069 from the PAC network. For the No Action alternative, the Cox Canyon Timber Sale would remain in suspension. For all action alternatives, the timber volume left in the Cox Canyon sale would be replaced from units analyzed for this project. For a more detailed description of the alternatives, refer to the Draft Environmental Impact Statement prepared for the Whale Rock project (USDA 1995c).

#### **IV. AFFECTED SPECIES AND HABITAT**

##### **California Red-legged Frog**

There are no known sightings of the California red-legged frog on the Eldorado National Forest and species authorities believe this species may be extirpated from many areas of the Sierra Nevada foothills, although a population has recently been discovered on the Plumas National Forest. This species is most closely associated with slow moving streams that contain deep water pools (>2.3 ft, >0.7m) and dense riparian vegetation. Individuals have been found using small mammal burrows and moist leaf litter up to 85 ft (26 m) from streams for estivation (Federal Register 1994).

Within the Whale Rock project area, suitable habitat would likely be located along the major drainages of Jaybird Canyon, Round Tent Canyon, Soldier Creek, South Fork American River and Silver Creek.

##### **Valley Elderberry Longhorn Beetle**

There have been no recorded sightings of valley elderberry longhorn beetles (VELB) on the Eldorado National Forest. Suitable habitat includes riparian corridors at or below 3000 feet that contain elderberry (*Sambucus* spp.). Habitat in the Whale Rock area would be located in the main drainages along the American River and Silver Creek canyons.

##### **Northwestern Pond Turtle**

This species has been found on the Eldorado National Forest and is suspected to occur within the American River and Silver Creek. Pond turtles may also occur in Jaybird Canyon, Round Tent Canyon, and Soldier Creek along with various springs and water holes scattered throughout the project area. Habitat requirements include the presence of riparian vegetation and basking sites in ponds and pools. Turtles have been observed in north coastal areas to travel up to 1/4 mile away from streamsides for nesting purposes and also for overwintering sites (Holland 1991). The same behavior has been reported in montane areas; however, the distance that turtles migrate here is not generally known.



### **California Spotted Owl**

Spotted owl surveys following the Region 5 protocol have been conducted in the Whale Rock project area since 1989. Informal surveys have occurred on a periodic basis since 1980. There are currently eight protected activity centers within the project area. They include: ED-036, ED-040, ED-042, ED-051, ED-053, ED-069, ED-206 and ED-216 (see Figure 15, pg. III-2 in DEIS). The current status for these PACs is as follows: ED-036 and ED-040 have had nesting status established in the past, ED-042 and ED-206 have their nests located on private land, ED-051, ED-053 and ED-216 have only had pair status established and ED-069 is a replacement PAC for a territory that was destroyed in the 1992 Cleveland Fire and is unoccupied. Also included in the project area are two spotted owl habitat areas (SOHA), SOHA ED-36 and SOHA ED-96.

Protected activity centers are generally found in the main drainages located within the project area, such as Jaybird Canyon and Round Tent Canyon. Those areas were initially delineated through the use of aerial photos to determine suitable owl habitat. Some of the PAC boundaries within the project area were adjusted in accordance with the CASPO guidelines in order to better protect the best available habitat and to make the boundaries easier to locate on the ground (see map B-5 and B-6). The SOHAs are both located in the Silver Creek Canyon and encompass one PAC each. Habitat found in these areas include Sierran Mixed Conifer with an understory that includes broad-leaved, deciduous trees such as alder, dogwood and willow. Within some of the PACs, namely ED-053 and ED-042, there are stands with a dense understory of young incense cedar and white fir. Foraging habitat in these thickets is considered to be low quality due to decreased flying space and increased hiding cover for prey species. All of the PACs and SOHAs have a heavy build of duff, heavy fuel loads and ladder fuels which increase the risk of catastrophic fire.

### **PAC ED-069**

In the process of field verification, PAC ED-069 was determined not to contain sufficient suitable acreage to support a spotted owl pair. This PAC was delineated after the Cleveland Fire as replacement for a PAC that was destroyed in the fire and does not contain any resident owls. There are no owl pairs or nest stands associated with this PAC and it was not listed in the CDFG database. The closest owl pair is located on private land northwest of the PAC boundary. This pair is associated with PAC ED-042, which contains higher quality habitat. In addition, there is not sufficient suitable habitat available in the area to effectively establish a 300-acre PAC. The 75 acres of suitable habitat contained in the PAC are outside of the project boundary. This area has been surveyed to protocol in 1989-1992 and casual surveys were conducted in 1993 and 1994 with no owls detected. Based on this analysis, it was recommended that the PAC be dropped from the network.



### **Northern Goshawk**

There are two northern goshawk management areas (GMA) located within the project boundary, GMA 501 and 502. These areas were surveyed for goshawks in 1992 and 1993 with no response. The entire project area was surveyed along all system roads in 1994 and 1995 following the Region 5 protocol. These surveys resulted in several new sightings recorded within the Whale Rock area. Of these new detections, no new nest stands were located. However, based on sighting locations and species behavior, five preliminary 120-acre goshawk territories (GMA 514-518) will be proposed to be added to the Forest Goshawk Network (see Figure B-7). Boundaries for the new GMAs may be adjusted if better information on nest stand locations becomes available. Habitat is mostly concentrated in drainages of Sierran Mixed Conifer. Stands with a dense understory provide limited foraging for goshawks as they require spacing beneath the canopy for maneuverability.

### **Fisher**

No comprehensive surveys have been conducted and no confirmed sightings have been documented for this species on the District. Surveys conducted on other areas of the Ranger District failed to detect any furbearers. Additional surveys have been conducted on other areas of the Eldorado National Forest in recent years which have also failed to detect fisher.

Within the project area, two potential fisher movement corridors, AN1 and UV1, and one potential fisher use area, F/G, have been identified based upon the amount of potentially suitable habitat identified in forest vegetation maps and aerial photos (see map B-4). These areas are found along the American River and Silver Creek Canyons. The remainder of the project area is not considered to contain suitable habitat for fisher due to the high road densities, private residences and habitat fragmentation from both private land holdings and past timber management activities (Freel 1991; USDA 1994).

## **V. EFFECTS ON SPECIES AND HABITAT**

### **Alternative A - No Action**

*Direct Effects:* There will be no project related direct effects to wildlife under Alternative A beyond the level presently occurring in the area. These disturbances include resident traffic, woodcutters and recreationists that utilize the current road system. The disturbances are mainly associated with summer use as most of the roads within the project area are closed during the winter and early spring. This alternative would not allow for the opportunity to obtain funding to further manage these roads through closures and/or obliterations. Habitat capabilities will remain in the same condition that currently occurs throughout the area.

*Indirect Effects:* Although there are no project related activities planned for Alternative A, the indirect effects to wildlife may be great. This alternative would result in the continuation of ongoing processes throughout the area; the most serious being a heavy accumulation of fuel, both on the ground and in fuel ladders. This significantly increases the risk of a large scale, catastrophic fire. Such a fire could destroy habitat for species present in the project area. Habitat that is lost through such a catastrophic event could take up to 200 years to sufficiently recover to a level that would be considered suitable for late seral species (USDA 1993c). The loss of suitable habitat may displace individuals to other areas, increasing competition within or between species.

Discounting the risk of catastrophic fire, there would still be indirect effects to wildlife habitat resulting from the lack of management activities in the area. Most of the forested stands in the area are in the mid-seral state with a dense understory of pole size trees. These overstocked stands are slow growing and will be slow to mature to late seral stages. There is also increased chance of insect caused mortality and disease, not only to pole and medium sized trees, but to large, old growth trees. The dense understory impedes movement of late seral species, such as northern goshawks and spotted owls.

#### **Effects Common to All Action Alternatives**

*Direct Effects:* Prescribed burning, harvest activities and road construction will result in the direct disturbance to some individuals of sensitive wildlife species present in the project area. However, funding created from management activities will provide the opportunity for habitat improvement projects such as road closures and/or obliterations which would lower risk of disturbance in the long term. The risk of disturbance to owls and goshawks from project activities will be minimized through the incorporation of limited operating periods and road closures into project design.

As described above, all attempts will be made to minimize the direct disturbance to individuals of sensitive wildlife species that may occur in the project area. However, there may be instances where activities within the limited operating period may be necessary. For instance, the prescribed burn program may require line construction or actual burning activity that would need to take place within the limited operating period dates in order to better meet management objectives. A separate, project-specific analysis would be conducted at that time to evaluate the activity effects based on the time of year, location (i.e., within 1/4 mile of a known nest) and the duration of project activities. The objectives of all management activities related to this project are to improve forest health in order to sustain wildlife habitats now and into the future. As stated in the DEIS for the spotted owl, owl numbers and distribution are currently sufficient to maintain viability of the species (USDA 1995b). The disturbance of one year's reproduction in a particular PAC, if not repeated over subsequent years, is not likely to adversely affect species viability. The risk to northern goshawks is considered the same as for owls as long as the disturbance is not repeated in the same GMA over multiple years. The long term habitat improvement for the species that would be



achieved through project activities would greatly outweigh the short term effect of disturbance to individuals.

The risk of project-related sedimentation affecting riparian species, such as red-legged frogs, valley elderberry longhorn beetles and pond turtles, is considered to be slight as project design includes streamside management zones, best management practices for reduced hydrologic impact and watershed improvement needs projects in sale area improvement plans. These measures will protect riparian habitat present within the project area. Road obliteration, road reconstruction and gating of new roads would all serve to reduce erosion and off-site sedimentation of streams. There is still a slight risk of disturbance to overwintering or nesting western pond turtles, as they have been reported to migrate as far as 1/4 mile into upland habitats from streamside zones in north coastal forests (Holland 1991).

The effect on fisher travel corridors should also be minimal. As described in the affected environment, the main travel corridor for fisher is located along the American River and Silver Creek canyons and will not be affected by project activities. On the small chance that fishers would utilize the interior of the project area, habitat should be minimally affected as treated areas will retain, at the minimum, 40% canopy closure and drainage bottoms and north facing slopes will not be affected.

Wildlife habitat for all of the above listed species will be improved directly through project activities. Stands proposed for treatment under each action alternative will be thinned in the understory using CASPO Interim guideline prescriptions. It is estimated that 60% of the stands that are currently classified as 3 N,G would be re-classified as 4 N,G after harvest. This is due to the CASPO prescription harvest of the smaller size class trees which leaves a higher average stand diameter. The change in canopy closure would vary by unit. All changes in canopy closure would comply with CASPO requirements. Some units would remain unchanged while some, such as in fuelbreaks, could lower by 50%. The fuelbreak management prescriptions proposed in Alternatives B and E are designed to harvest the maximum that CASPO allows in order for them to be considered effective. It is estimated that all 3 N,G stands that are harvested will drop one canopy closure class. All 4 N,G stands will retain the same canopy closure designation. These thinned stands will directly improve and expand foraging habitat for both spotted owls and goshawks by allowing for greater maneuverability while still protecting the overstory cover. The extensive prescribed burning program will also directly improve wildlife habitat by removing the ground and ladder fuels that have built up over the past 80 years. This will aid in the protection of wildlife habitat for all of the above listed species from stand replacing wildfire.

Snag levels, based on project related stand exams, are currently at an average of 14 snags/acre (USDA 1995c). Post-project snag levels in all alternatives will comply with CASPO requirements of 8 snags/acre or 20 ft<sup>2</sup>/acre basal area. Snag levels on north slopes and drainage bottoms are expected to remain unaffected as minimal activities are planned here (USDA 1995c).



Road densities for all action alternatives will increase slightly over current levels. New road construction mileage ranges from one mile in Alternative C to 2.2 miles in Alternatives E. All new construction occurs as extensions or spurs off of existing roads. None of the new construction will be within a spotted owl PAC or fisher use area. All new roads will be closed to public use upon the completion of project activities. There may also be a potential benefit to wildlife by increasing access to wildfires for fire suppression crews, thus reducing fire size through decreased response times. Funds collected from harvest activities will provide the opportunity to reduce open road densities by road closures and/or obliterations.

*Indirect Effects:* The extensive thinning and prescribed burn program proposed in all the action alternatives, with the exception of Alternative D, will improve habitat for sensitive wildlife species occurring in the project area. As described in the affected environment, the project area is characterized with dense, overstocked stands that contain thickets of white fir and incense cedar in the understory. The thinning of these stands will release the remaining trees to increased growth rates and decreased mortality rates through improved stand health and less competition for available resources. Stands that are currently classified as timber strata 3 will reach late seral strata (size class 4) at an increased rate. This will increase and improve the available habitat for late seral species such as northern goshawk, spotted owl and fisher.

The prescribed burning that is proposed in the area will further aid in the improvement of wildlife habitat. Controlled burning will be utilized both to reduce slash in thinned stands and to reduce fuel loading in areas not proposed for harvest. In the short term, burning will reduce the probability of a catastrophic fire occurring in the project area, such as the Cleveland Fire to the east. In the long term, prescribed burning will initiate the return to the historical landscape that was present prior to heavy fire suppression. Large, widely spaced ponderosa pines with a diverse understory of low-lying shrubs, forbs and herbaceous plants was characteristic of the historical landscape. These treated units may be considered lower quality habitat for late seral wildlife compared to current conditions. However, this landscape was adapted to frequent understory fire and represents more sustainable habitat for sensitive wildlife species over the long term.

The reduction in fire risk will also protect habitat for riparian associated species such as red-legged frog and pond turtle. In the event of a catastrophic fire, these species are not only directly affected by the loss of habitat, but indirectly by increased siltation rates downstream (Holland 1991). By managing the habitat for greater fire resiliency, there is less chance of increased siltation rates that would result from such a fire.

### **Alternative B**

Under this alternative, a total of 3,181 acres are planned for harvest in natural stands, 914 acres would be harvested for fuelbreaks and 562 acres of plantations would be thinned. In addition, 6303 acres are proposed for prescribed burning, with 590 acres within PAC boundaries.

*Direct Effects:* Proposed harvest units are within 1/4 mile of the activity centers for PACs ED-036, ED-040, ED-042, ED-053 and ED-216. A limited operating period is designated for those units. There are also harvest units within GMAs 515 and 518. Portions of these units are within the potential goshawk nest stand. There will be a limited operating period designated for those units. In addition, these units will be harvested to retain the existing overstory canopy. Harvest prescriptions will include the provision that no trees with large stick nests (nests greater than 12 inches in diameter) or “witches brooms” will be marked without review by a wildlife biologist.

In addition to harvest activities, 29.3 miles of road reconstruction and 1.7 miles of new road construction are proposed under Alternative B. None of the proposed road construction is within a PAC boundary, a GMA or a fisher use area. All of the new construction consists of extensions of already existing spur roads. As these routes will not form any new loop routes and will be closed to public use, it is not expected that this will change habitat quality or increase disturbance for sensitive species.

Proposed prescribed burn areas are within 1/4 mile of the activity centers for PACs ED-036, ED-040, ED-042, ED-051, ED-053 and ED-216 and within GMAs 515 and 518. Most of the burning would occur in late fall or winter and so would be outside the limited operating period. Prescribed burning within some of the PAC boundaries without first mechanically thinning the stand poses a greater risk of the burn escaping control. Fuel ladders and pockets of dense fir and cedar thickets left in the understory could carry heat higher up into large trees, increasing the risk of damaging the overstory. In addition, high ground fuel loading will make the protection of large down logs and snags more difficult. To reduce these risks, fire prescriptions would be more conservative. Less fuels would be removed with each treatment and more treatments will be needed to achieve the desired results. This will expose spotted owls and goshawks to more periods of disturbance.

*Indirect Effects:* In the long-term, the results gained from implementing Alternative B would have a positive effect on sensitive wildlife species within the project area. For the 562 acres of plantations that are thinned, growth rates for the remaining trees are expected to increase by approximately two to three times the current growth rate. The growth rates in natural stands would also increase. Using the timber growth model *Prognosis* and assuming an even age distribution within the size class 3 strata, all of the 3N and 3G stands would grow into size class 4 within 30 years. It is estimated that the amount of 4 N,G timber strata stands would increase in size from 1995 acres to 9450 acres within 50 years due to the increase in growth rates (USDA 1995c). Refer to the Whale Rock DEIS, Chapter IV, for a more detailed description of effects on vegetation. The mortality within these stands would decrease due to less competition for required nutrients. The thinning of the stands, along with the extensive prescribed burning, will begin to favor ponderosa and sugar pines over white fir and incense cedar because the pines are better adapted to a frequent fire environment. Snag and down log levels within treated units would likely decrease over the long term due to reduced recruitment from healthier stands and due to incremental losses from frequent burning. However, snags that would be recruited in these healthier stands would be larger in size and of more use to wildlife. Snag and log levels would more closely



resemble levels within the natural range of variability for this ecotype. The possible decrease in snag levels in treatment units would have minimal landscape-wide effects on late seral species as levels in drainage bottoms and north slopes will remain unaffected by project activities.

Expanded late seral forest would increase the habitat available in the area for species dependent on that habitat type, such as spotted owl, goshawk and fisher. Improved stand health and increased fire resiliency would also benefit these species by protecting the habitat from catastrophic events like wildfire and insect epidemics. In the long-term, increased growth rates and decreased mortality in treated units will reduce the late seral fragmentation by producing healthier late seral stands at a more rapid rate than is currently occurring. Riparian dependent species, such as red-legged frog, valley elderberry longhorn beetle and northwestern pond turtle, would benefit from decreased fire risk and improved water filtration rates (USDA 1995c).

### **Alternative C**

The treatment prescriptions for Alternative C has nearly the same prescriptions as Alternative B except that management occurs on fewer acres. In addition, an adaptive management strategy is proposed within the protected activity centers. In this alternative, it is recommended that three PACs be thinned prior to prescribed burning activities in order to better protect the stand. The understory thinning would occur on approximately 141 acres within PAC boundaries in addition to the 1986 acres of natural stands outside of PACs. Slightly more than 3,000 acres would be prescribed burned without pre-burn thinning.

*Direct Effects:* There are proposed harvest units within 1/4 mile of the activity centers for PACs ED-040, ED-053 and ED-216. There are also harvest units within GMAs 515, 516 and 518. Part of these units are within the potential goshawk nest stand. In the short-term, there would be a risk of increased disturbance to individual spotted owls and goshawks due to the proposed harvest entry. These effects would be minimized through limited operating periods. Thinning of overstocked stands within PACs and GMAs would directly improve habitat by opening up the understory in those stands to allow for foraging. In the long-term, thinning the PACs and GMAs prior to burning would actually pose less of a threat of disturbance than trying to accomplish the same results with burning alone. In order to achieve the desired condition outlined in the DEIS (see Figure B-1), these areas would need to be entered four or five times if only prescribed burning was used. In comparison, if thinning is used prior to burning, only two entries would be necessary to achieve the desired condition. There would also be less risk of a controlled burn escaping if the stand was thinned prior to burning. Harvest prescriptions for units proposed within PACs or GMAs would retain the existing overstory canopy closure. Based on the reduction in risk from catastrophic fire and the improved foraging habitat, the adaptive management strategy proposed in this alternative would better meet the intent of the CASPO guidelines by protecting and improving owl habitat in PACs.



In addition to harvest activities, there is 19.2 miles of road reconstruction and 1.0 mile of new construction proposed under Alternative C. None of the proposed road construction is within a PAC or GMA boundary or fisher use area. All of the new construction is extensions of already existing spur roads. As these routes will not form any new loop routes and will be closed to public use, it is not expected that they will change habitat or increase disturbance for sensitive species.

*Indirect Effects:* The indirect effects for Alternative C would be the same as described for Alternative B for those acres that are thinned prior to large scale prescribed burning. However, those positive benefits are offset by the increased acreage that is proposed to be burned without mechanical thinning and by the lack of fuelbreaks planned under this alternative. For areas that will be treated by burning alone, as many as five burn cycles would be necessary to reach the desired condition in those units. This increases the time frame that the area would be in a high to moderate fire risk and increases the chance of a control burn escaping. The lack of fuelbreaks in this alternative also adds to risk of prescribed burning. One of the advantages of a fuelbreak is to provide an anchor point that has reduced fuel loads for prescribed burning. If a control burn escapes without a fuelbreak as a holding point, it would be more difficult to contain the fire. This poses an increased risk to wildlife habitat being negatively affected in the event of an escaped prescribed burn.

#### **Alternative D**

Alternative D proposes to treat the least amount of acreage of all the action alternatives. A total of 962 acres are proposed for harvest in natural stands; 562 acres of plantations would be thinned with no fuelbreaks proposed. In addition to thinning, 1765 acres are proposed for prescribed burning, with no treatment in PACs.

*Direct Effects:* The changes in habitat types would be essentially the same as described in the section "Effects Common To All Action Alternatives" section, except that the changes would occur on substantially fewer acres. Proposed harvest units are within 1/4 mile of the activity center for PAC ED-042. A limited operating period would be designated for that unit. There are also harvest units within GMAs 515 and 518. Portions of these units are within the potential goshawk nest stand. There will be a limited operating period designated for those units. In addition, these units will be harvested to retain the existing overstory canopy. Harvest prescriptions will include the provision that no trees with large stick nests (nests greater than 12 inches in diameter) or "witches brooms" will be marked without review by a wildlife biologist.

In addition to harvest activities, 14.9 miles of road reconstruction and 1.6 miles of new construction are proposed under Alternative D. None of the proposed road construction is within a PAC boundary, GMA or a fisher use area. All of the new construction consists of extensions of already existing spur roads. As these routes will not form any new loop routes and will be closed to public use, it is not expected that they will change habitat quality or increase disturbance for sensitive species.

Proposed prescribed burn areas are within 1/4 mile of the activity center for PAC ED-042. Most of the burning would occur in late fall or winter and so would be outside the limited operating period.

*Indirect Effects:* The indirect effects for Alternative D would be the same as described for Alternative B in those stands that are proposed for treatment. However, these stands represent a small percentage of the project area. Overall, the habitat conditions will remain the same as those currently occurring in the project area. The risk of a catastrophic fire destroying all or most of the wildlife habitat within the area would remain great.

### **Alternative E**

The objective of Alternative E is to integrate various treatments proposed in Alternatives B-D in order to meet goals desired by fire, wildlife and timber to improve forest health and manage the ecosystem. A total of 2203 acres are proposed for harvest in natural stands, 562 acres of plantations would be thinned and 914 acres would be harvested for fuelbreaks. In addition to thinning, 4510 acres are proposed for prescribed burning, with 590 acres in PACs.

*Direct Effects:* Proposed harvest units are within 1/4 mile of the activity center for PACs ED-042, ED-053 and ED-216. A limited operating period would be designated for those units. There are also harvest units within GMAs 515, 516 and 518. Portions of these units are within the potential goshawk nest stand. There will be a limited operating period designated for those units. In addition, these units will be harvested to retain the existing overstory canopy. Harvest prescriptions will include the provision that no trees with large stick nests (nests greater than 12 inches in diameter) or “witches brooms” will be marked without review by a wildlife biologist.

In addition to harvest activities, there is 32.1 miles of road reconstruction and 2.2 miles of new construction proposed under Alternative E. None of the proposed road construction is within a PAC boundary or a fisher use area. All of the new construction consists of extensions of already existing spur roads. As these routes will not form any new loop routes and will be closed to public use, it is not expected that they will change habitat quality or increase disturbance for sensitive species.

Proposed prescribed burn areas are within 1/4 mile of the activity centers for PACs ED-036, ED-040, ED-042, ED-051, ED-053 and ED-216 and GMAs 515, 516 and 518. Most of the burning would occur in late fall or winter and so would be outside the limited operating period. Since the PACs would not be thinned prior to burning under this alternative, the risk of an escape controlled burn may be greater. However, this risk will be minimized by the fuelbreaks which are proposed in Alternative E balanced by the habitat outside of the PACs which will be thinned prior to burning. This will provide a strong anchor point to burn within the PACs while controlling the risk of a prescribed burn escaping the control lines. The quicker reduction of fuel loading on larger acreages



outside the PACs than achieved in Alternative C (7 years as opposed to as much as 28 years in Alternative C) reduces the overall risk of catastrophic fire in these PACs. Also, a larger portion of the project area would move toward the desired condition in this alternative (as opposed to Alternative C), resulting in an improved and more sustainable wildlife habitat.

*Indirect Effects:* The indirect effects for Alternative E would be the same as described for Alternative B except that the prescribed burning would occur on 1793 fewer acres.

### **Effects of the Deletion of Protected Activity Center ED-069**

*Direct Effects:* The direct effect of eliminating PAC ED-069 from the PAC network would be that the area would then be open to future management activities, including harvest. However, given the current trends and direction in forest management, this is not believed to be a negative effect on spotted owls. The area, including ED-069, has been surveyed since 1989 with no owls located within the PAC boundaries. The closest documented owl pair is located at T12N, R13E, Section 36, on Sierra Pacific Industries land. The best available habitat that was used to establish PAC ED-042 is located to the west of the private land in Section 35. During past survey efforts, owls have been observed within the ED-042 boundary. Any activities that would occur following elimination of PAC ED-069 that would come within 1/4 mile of the nest stand for ED-042 would have a limited operating period established to protect those owls.

According to the CASPO DEIS, the current population of spotted owls in Sierran forests is well distributed and of sufficient numbers to maintain viability of the species (USDA 1995b). Within the project area and across the district, the density and distribution of PACs are consistent with the rest of the Sierra Nevada (USDA 1995a, 1995b). The elimination of ED-069 will not affect distribution of protected habitat. PAC ED-042 provides highly suitable habitat approximately 1/2 mile to the northwest of ED-069. In addition, the canyon of Silver Creek has and will provide highly suitable dispersal habitat as no management activities will likely occur here due to steep canyon walls and the subsequent lack of access. Therefore, even if an owl was observed in the area of ED-069, it is unlikely that a new PAC would be established. The removal of PAC ED-069 will not affect the viability of or future management options for the spotted owl.

Based on sightings recorded in the 1994-95 survey effort for northern goshawk, GMA 515 has been proposed in the vicinity of PAC ED-069. There was no nest location discovered in association with those sightings. It is not believed that the pair that may be associated with this GMA will be affected by the deletion of the PAC.

No other sensitive species will be directly affected by dropping ED-069 from the PAC network.

*Indirect Effects:* Indirect effects associated with this proposal would mainly have beneficial benefits to sensitive wildlife species. As stated in the discussion of the



existing environment, PAC ED-069 does not contain sufficient suitable habitat to support an owl pair. An area of approximately 75 acres within the PAC is considered suitable habitat. The rest of the acreage is marginal at best. There are also three young plantations contained within the PAC boundaries. Opening the area up to management activities would allow for improvement of habitat at a more rapid pace. Stands could then be thinned and prescribed burned to improve stand vigor and to reduce the fire danger in the area. This would also allow for better protection of PAC ED-042 to the north. All management activities would follow CASPO guidelines and so would preserve future management options for improved spotted owl habitat.

## **VI. CUMULATIVE EFFECTS**

The Whale Rock Project area is typical of heavily managed forests that occur at lower elevations in the Sierra Nevada. The area historically was likely to have been open Ponderosa pine stands interspersed with oak woodlands, mixed conifer in drainages and brush fields (see Figure B-2). Through past management activities such as logging, wildfire and fire suppression, the area is now dominated with overstocked, 30 year old ponderosa pine plantations and encroaching white fir and cedar thickets (see Figure B-3). A forest that was once adapted and resilient to frequent understory fires is now highly susceptible to a large scale, catastrophic fire. Evidence of the fire danger is seen in the Cleveland Fire to the east, which occurred in vegetation almost identical to what occurs in the Whale Rock analysis area. The Whale Rock Forest Health Multi-Resource Project was designed to manage the landscape at a scale large enough to affect a change in forest health and fire behavior conditions. This scale of management is in concurrence with the Forest Service's direction of ecosystem level planning. All action alternatives proposed under this project attempt to reduce the fire danger and thin stands to aid in returning the area to the conditions present in the historical landscape.

This is especially important in the protection and improvement of sensitive wildlife habitat within the project area. This habitat is extremely susceptible to a catastrophic, stand replacing fire if no management occurs within the area in the near future. All action alternatives reduce this danger to some degree, with Alternative B having the greatest fuels reduction and Alternative D the least. All alternatives that propose thinning in the stands prior to burning will, in general, require fewer entries into an area in order to reach the desired condition (Mackey 1995). This provides for two beneficial effects to sensitive species: 1) less cumulative direct disturbance to individuals in reaching the desired condition and 2) decreasing the risk of catastrophic fire in a shorter time period than if prescribed burning alone was used. A greater number of large size class snags, as well as most medium to large trees, would survive these burns as fuel loads are lowered. The improvement and protection of the wildlife habitat is even more critical when the lack of habitat provided by the Cleveland Fire area is considered. If a stand replacing fire were to occur throughout the Whale Rock area, an effective barrier 11 miles wide would be created for most sensitive species. This could not only affect individuals present within the project area, but also individuals outside of the area through increasing competition for resources.

After consecutive years of burning, it has been observed that on south facing slopes snag levels have decreased to an average of 0.7 snags/acre (Mackey 1995). This may have a cumulative effect on sensitive species dependent on snags, such as spotted owls and fishers. A large down log component has been shown to support the prey base utilized by these species. In the long term, however, this effect is expected to stabilize as the treated landscape returns to the historical range of variability of snag and log levels that occurred prior to heavy fire suppression (Mackey 1995, Muir 1894). Prey availability in treated areas (approximately 20% of the project area) will resemble what was present in the historic landscape.

Another result of past management activities and the 1959 Icehouse Fire is the fragmentation of late seral stands throughout the project area. Large, continuous blocks of late seral stands present the greatest value to species dependent on this type of habitat, such as spotted owl, goshawk and fisher. The cumulative effects of the Whale Rock Project and future activities will be to eventually recreate parklike, open stands on south facing slopes and ridgetops, with single storied stands of large-size trees with low to medium canopy closures. Stands on north facing slopes and drainage bottoms would likely have little management activity and would be allowed to develop the late seral attributes necessary to support the late seral species described above. The long-term cumulative effect of the Whale Rock project would be the protection of continuous, late seral stands on north facing slopes through the development of fire resilient stands on the south facing slopes. This may result in the gradual shift of late seral species from current locations to distributions that more closely resemble historical patterns.

Other foreseeable actions that could occur within the project area include the 1996 Vegetation Management in Conifer Plantations Environmental Assessment; precommercial thinning of a 25 acre plantation and 30 acres of natural stands; and a roadside hazard tree removal project affecting approximately 5 acres and 25 MBF. These projects are all limited in size and scope and are not expected to significantly contribute to the cumulative effects on wildlife species. A prescribed burn program is expected to continue throughout the area.

## **VII. DETERMINATION**

Based on the analysis conducted in section I, implementation of this project will have no effect on the following threatened, endangered or Region 5 sensitive species:

Peregrine Falcon  
Bald Eagle  
Delta Smelt  
Sacramento Splittail  
Great Gray Owl  
Willow Flycatcher  
Marten  
Sierra Nevada Red Fox

This determination is based on analysis of the following general effects of Alternatives B-E:

- Direct disturbance to individuals
- Slight increase to road densities
- Improvement of stand health and vigor
- Reduced risk of catastrophic fire
- Retention of 8 snags/acre

For the Forest Service sensitive species, implementation of Alternatives A-E may affect individuals, but is not likely to result in a trend toward Federal listing for:

California Spotted Owl  
Northern Goshawk  
Fisher  
Northwestern Pond Turtle

For the Federally proposed California Red-legged frog, the implementation of Alternative A is not likely to jeopardize the continued existence of the species.

For the Federally threatened valley elderberry longhorn beetle, the implementation of Alternative A, the No Action alternative, may affect but is not likely to adversely affect the species or its habitat.

Implementation of Alternatives B-E will have no effect on the red-legged frog or valley elderberry longhorn beetle due to protection of riparian areas through streamside management zones and other project designs.

The selection of the No Action alternative, Alternative A, in the final EIS for the Whale Rock project will require informal consultation with the U.S. Fish and Wildlife Service for concurrence on the determinations for red-legged frog and valley elderberry longhorn beetle.

## **VIII. RECOMMENDATIONS FOR MITIGATION**

The following mitigation measures will reduce the effects associated with this project, effects to individuals and the likelihood that the project will result in a trend toward Federal listing:

- 1) Close all new roads to public use to reduce possible disturbance to sensitive species.
- 2) Propose the addition of Goshawk Management Areas 514-518 to the Forest Goshawk Network. Monitor these GMAs to better determine nest



stand location. A limited operating period will be required for activities occurring within the GMA or within 1/4 mile of the suspected nest stand.

- 3) For harvest units within suspected nest stands for Goshawk Management Areas, the existing canopy closure will be retained. Trees with a stick nest (nests greater than 12 inches in diameter) or "witches broom" will not be marked without review by a wildlife biologist.
- 4) If activities such as line construction or a burn prescription would require burning within the limited operating period, a site-specific evaluation would be done by the district biologist at that time. Analysis would depend on time of year, duration of activity and location (i.e., within 1/4 mile of nest stand).

## IX. REFERENCES

### California Department of Fish and Game

- 1989 Ecology of a Sierra Nevada population of willow flycatchers (Empidonax trailli), 1986-1987.

### Federal Register

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**MANAGEMENT INDICATOR SPECIES  
HABITAT CAPABILITY ANALYSIS  
FOR THE WHALE ROCK FOREST HEALTH  
MULTI-RESOURCE PROJECT**

**ELDORADO NATIONAL FOREST  
PACIFIC RANGER DISTRICT**

*Please use this page for notes.*

## **MANAGEMENT INDICATOR SPECIES HABITAT CAPABILITY ANALYSIS**

### **I. INTRODUCTION**

Management indicator species are used in environmental analysis to represent a large group of vertebrates that have similar habitat requirements, thereby addressing habitats that are most important to the viability of wildlife populations and diversity. In addition, management indicator species are used to show environmental conditions and trends for wildlife, especially in regard to the recovery of threatened and endangered species, the maintenance of population viability in vertebrates, and the production of game and special interest species to meet recreational demands.

### **II. MANAGEMENT DIRECTION**

The Eldorado National Forest Land and Resource Management Plan (LRMP) states the need to 'maintain medium to high quality (capability) habitat according to the Habitat Capability Models for management indicator species (MIS) and Habitat Quality Criteria for special habitats' (Management Practice 35, LRMP). In addition to this management practice, Management Practices 41 (Early/Mid Successional Stage Management), MP 44 (Snag and Down Log Management) and MP 45 (Hardwood Management) provide specific guidelines for the management of some indicator species.

### **III. DESCRIPTION OF PROJECT**

The Whale Rock Project area includes all Forest Service land west of the Cleveland Fire area (see Figure 1, pp. I-2 in DEIS). It is bound on the south by the South Fork of the American River and on the west and north by Silver Creek. All action alternatives involve a two phase process in order to reduce the risk of catastrophic wildfire and to improve forest health. In Alternatives B-E, the first phase involves the thinning of stands through timber harvest operations; the second phase involves a large scale prescribed burn program to reduce fuel loading. These alternatives have the same general treatment prescriptions but vary in the amount and area to be treated (see Table 3, pp. II-43 in the DEIS for summary). Each action alternative also involves some level of road construction and reconstruction. Alternatives B and E also propose to build shaded fuelbreaks on major ridgetops throughout the project area. All action alternatives follow the CASPO Interim guidelines for snag and down log levels. For a more detailed description of the alternatives, refer to the Draft Environmental Impact Statement (DEIS) prepared for the Whale Rock project.



#### IV. AFFECTED ENVIRONMENT

The analysis area is characterized by dense canopied mixed conifer and ponderosa pine stands interspersed with oak woodlands, conifer plantations and recently harvested conifer stands now dominated by shrubs, grasses and forbs. Much of the analysis area burned in the 1959 Icehouse Fire and presently consists of overstocked ponderosa pine plantations. Sierran mixed conifer is generally concentrated in drainages with either ponderosa pine or montane hardwood conifer near ridgetops (see Figure B-3). Also occurring in patches throughout the area are pure stands of black oak, and mature to overmature brush fields containing mostly manzanita, deerbrush, buckbrush and whitethorn. The public land in the area is bordered by private land owners, primarily Sierra Pacific Industries, with other small parcels held by various private owners. There is an approximate road density of 3.5 miles per square mile within the project area. However, many of these roads are seasonally closed from November to May. Snags (>15" DBH) in the project area were estimated to average 14 per acre and down logs (>15" DBH) 12 per acre, according to stand exams that were conducted within proposed harvest units.

##### Black Bear

The Habitat Capability Model (HCM) for black bear considers factors of 1) vegetation type, both overstory and understory, and varying by season; 2) road densities; 3) distance to open water; and 4) dead and down woody material. In addition, denning sites, wet meadows and springs, and levels of human activity affect the rating. Using these considerations, the project area is providing year-round habitat at the medium capability level.

##### Mountain Quail

The HCM for mountain quail considers vegetation type and strata as the primary factors. Other considerations which affect the rating include availability of brush and water, availability of acorns as winter food and steep slopes with escape cover. The project area provides year-round habitat at the high capability level.

##### Mule Deer Winter Range (including Critical Winter Range)

The HCM for mule deer considers factors of 1) vegetation type and strata; 2) escape cover patch size; 3) cover to forage ratio; and 4) road densities. Critical winter range considers the factors above, as well as emphasizing basal area and crown cover in mast producing hardwoods. Habitat is considered medium capability, with a trend towards low capability, due to overmature brushfields and dense understory thickets of fir and incense cedar. Also affecting habitat are the high road density and the lack of reproduction in hardwood stands due to heavy duff accumulations.

### Cavity Nesting Birds

The HCM for cavity nesting birds considers snag availability as the only factor. This model assumes that providing snags sufficient to maintain at least 60% of the maximum potential population will maintain cavity nesting bird populations. Snag surveys that have been conducted within the area show that high capability habitat is being maintained.

## **V. ENVIRONMENTAL CONSEQUENCES**

*No Action:* The No Action alternative would result in the continuation of ongoing processes throughout the project area. Habitat capabilities would remain at current levels, with a trend toward lower capability for mule deer. The biggest effect under this alternative would be the risk of a catastrophic fire occurring. Such a fire would destroy habitat for all MIS species in the project area. The loss of habitat may displace individuals to most other areas, increasing competition within or between species. An effective barrier 11 miles wide would be created for all species until habitat could recover. Approximately 13% of the Pacific Deer Herd winter range was burned in the Cleveland Fire. An additional 21% would be affected if a large scale fire occurred in the Whale Rock area.

*Action Alternatives:* Effects of all action alternatives on non-sensitive MIS species will be described below.

### Black Bear

Habitat capability for black bear is most affected by road densities, amounts of dead and down woody material and the amount of human activity. Under the action alternatives of this project, road densities will increase slightly during project activities. However, this effect will be offset by the road closures and/or obliterations that would be funded with dollars collected for management activities. The amount of dead and down material that will be retained under the CASPO prescriptions will be more than adequate for black bears. Human disturbance during project activities may cause a temporary displacement of individuals within management units. On a landscape level, this effect is considered minimal as only 25% of the landscape in the area, at most, will receive treatment. On a landscape level, medium capability habitat will be maintained for black bear.

Cumulative effects of this project will be positive for black bear under all action alternatives. Habitat will be maintained or improved through management designed to return the area to conditions occurring in the historical landscape. Black bear habitat will also be better protected against stand replacing, catastrophic fire under all action alternatives. The Whale Rock area will provide a more healthy and sustainable environment for black bear in the long term.

### Mountain Quail

Habitat capability for mountain quail is most affected by maintenance of early to mid-seral stage habitats. All action alternatives of this project will maintain openings for early seral stages. The thinning and subsequent prescribed burning of stands will have a short term negative effect on quail habitat by temporarily removing the suitable habitat until regeneration of brush and forbs occur. In the long term, habitat will be improved by the re-establishment of low-lying brush, forb and herbaceous plant understory that historically occurred in late seral ponderosa pine stands. Overmature brushfields will also be regenerated through the large scale burning that is included in all of the action alternatives except Alternative D. This may cause a temporary displacement of individuals while activities are occurring but overall will improve habitat in those fields. High capability habitat will be maintained for mountain quail throughout the Whale Rock area.

### Mule Deer

Habitat capability for mule deer winter range is most affected by vegetation type, cover to forage ratio and road densities. All action alternatives will improve winter range for mule deer. Wintering deer will benefit from small, dispersed openings created in the canopy and from grasses and forbs that will invade understory released from heavy slash and duff accumulations through thinning and prescribed burning. Winter forage will also be improved by the regeneration of overmature brushfields through burning. In addition, all oak stands will be protected during harvest activities. Burning will aid in the regeneration of oak stands by removing the heavy duff layer to allow for germination. This will provide for winter forage for future generations. Road densities will increase slightly during management activities. Funding provided in relation to the project will be used to close and/or obliterate roads within the project area. This will decrease the possibility of disturbance in the long term.

This project will result in positive cumulative effects for the Pacific deer herd. It will create greater opportunity to combine efforts with the California Department of Fish and Game to improve habitat for mule deer. Under all action alternatives, the habitat capability for mule deer will be maintained at the medium level with a trend of improvement toward higher quality.

### Cavity Nesting Birds

Habitat capability for cavity nesting birds is affected by the availability of large snags. All action alternatives will maintain snags at levels required by the CASPO Interim guidelines of 8 snags per acre. This will maintain the maximum potential populations of cavity nesting birds. The improvement of forest health and the subsequent development of late seral stands at an increased rate will assure recruitment of large size class snags in the future.



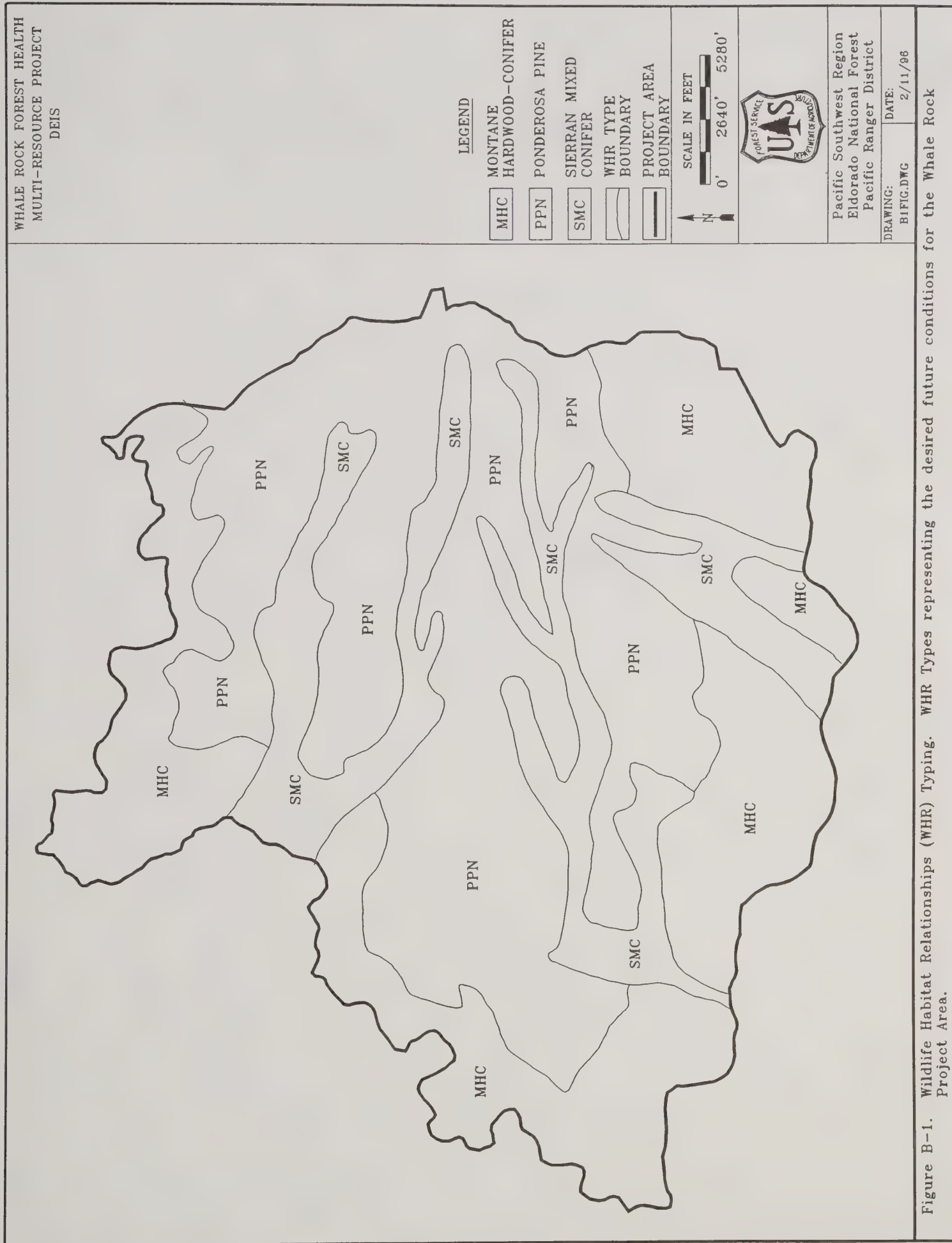
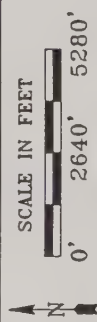


Figure B-1. Wildlife Habitat Relationships (WHR) Typing. WHR Types representing the desired future conditions for the Whale Rock Project Area.

WHALE ROCK FOREST HEALTH  
MULTI-RESOURCE PROJECT  
DEIS

LEGEND

	MONTANE CHAPARRAL
	MONTANE HARDWOOD-CONIFER
	MONTANE HARDWOOD
	PONDEROSA PINE
	SIERRAN MIXED CONIFER
	10-24% CANOPY CLOSURE
	25-39% CANOPY CLOSURE
	40-59% CANOPY CLOSURE
	60-100% CANOPY CLOSURE
	WHR TYPE
	BOUNDARY
	PROJECT AREA
	BOUNDARY



Pacific Southwest Region  
Eldorado National Forest  
Pacific Ranger District

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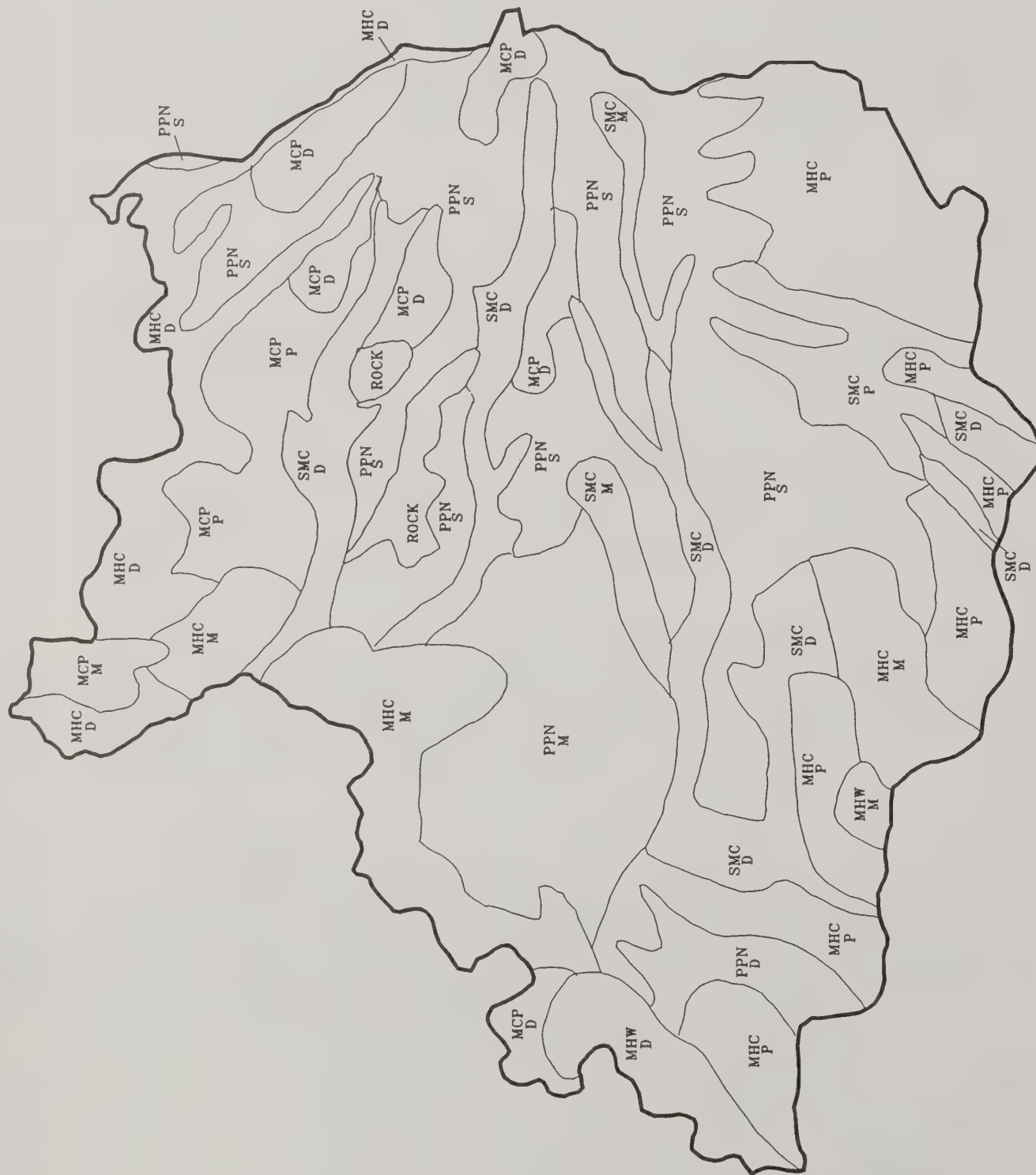
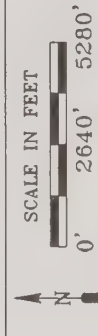


Figure B-2. Wildlife Habitat Relationships (WHR) Typing. Typed from 1940 Aerial Photos.

WHALE ROCK FOREST HEALTH  
MULTI-RESOURCE PROJECT  
DEIS

LEGEND

MCP	MONTANE CHAPARRAL
MHC	MONTANE HARDWOOD - CONIFER
MHW	MONTANE HARDWOOD
PL	PLANTATION
PPN	PONDEROSA PINE
SMC	SIERRAN MIXED CONIFER
S	10-24% CANOPY CLOSURE
P	25-39% CANOPY CLOSURE
M	40-59% CANOPY CLOSURE
D	60-100% CANOPY CLOSURE
—	WHR TYPE BOUNDARY
—	PROJECT AREA BOUNDARY



Pacific Southwest Region  
Eldorado National Forest  
Pacific Ranger District

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2/11/96

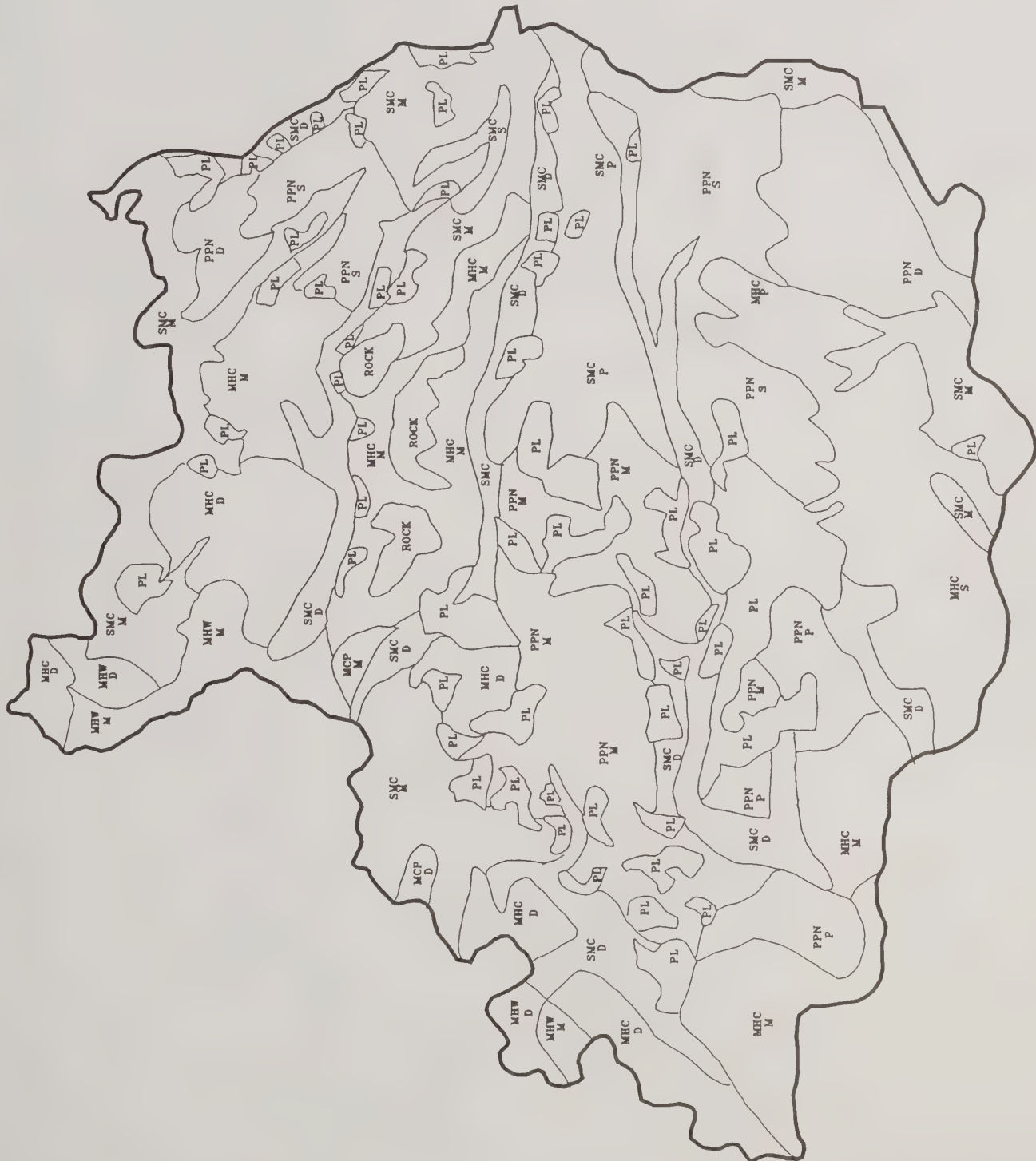


Figure B-3. Wildlife Habitat Relationships (WHR) Typing. Typed from 1991 Aerial Photos.



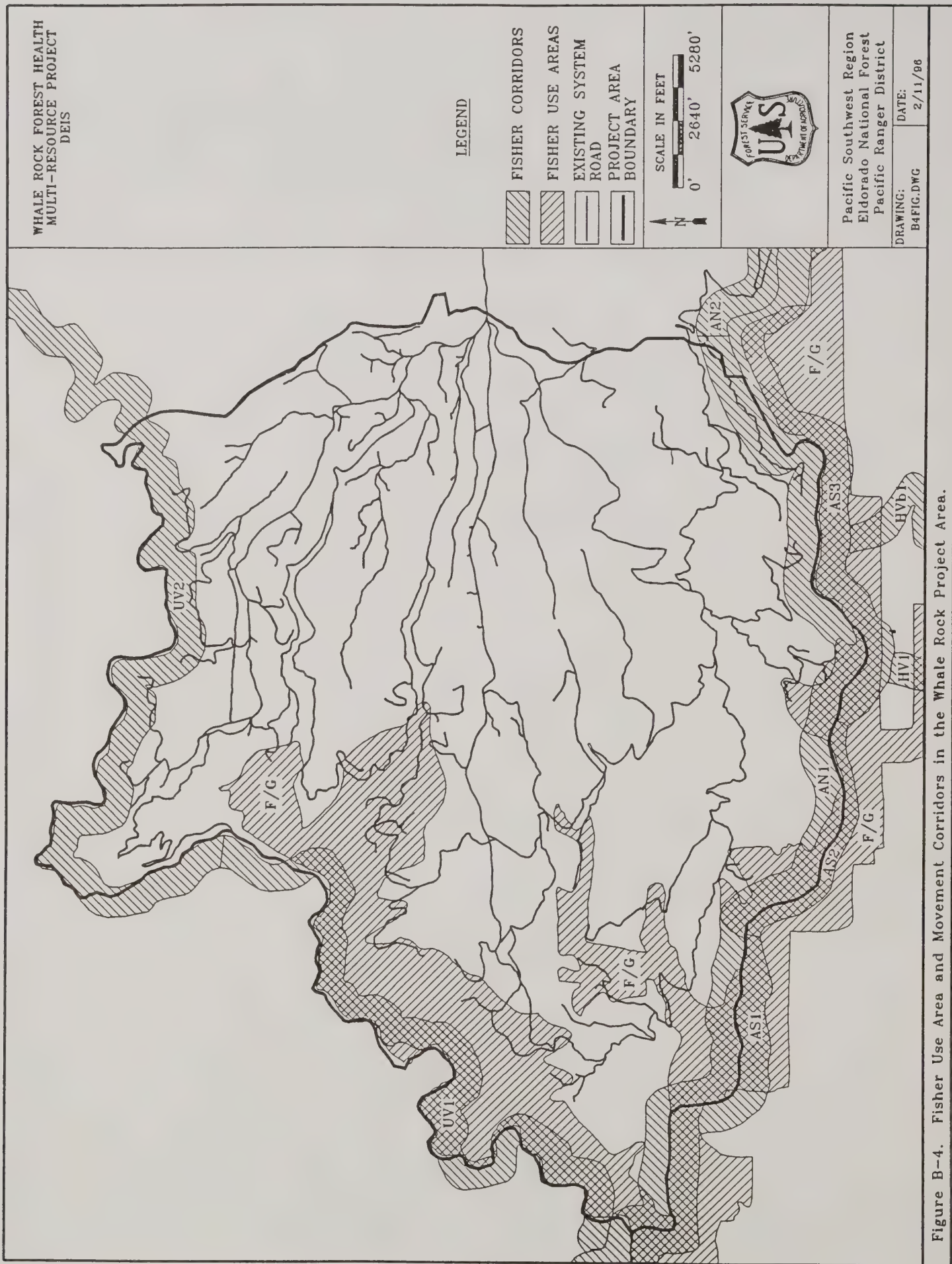


Figure B-4. Fisher Use Area and Movement Corridors in the Whale Rock Project Area.

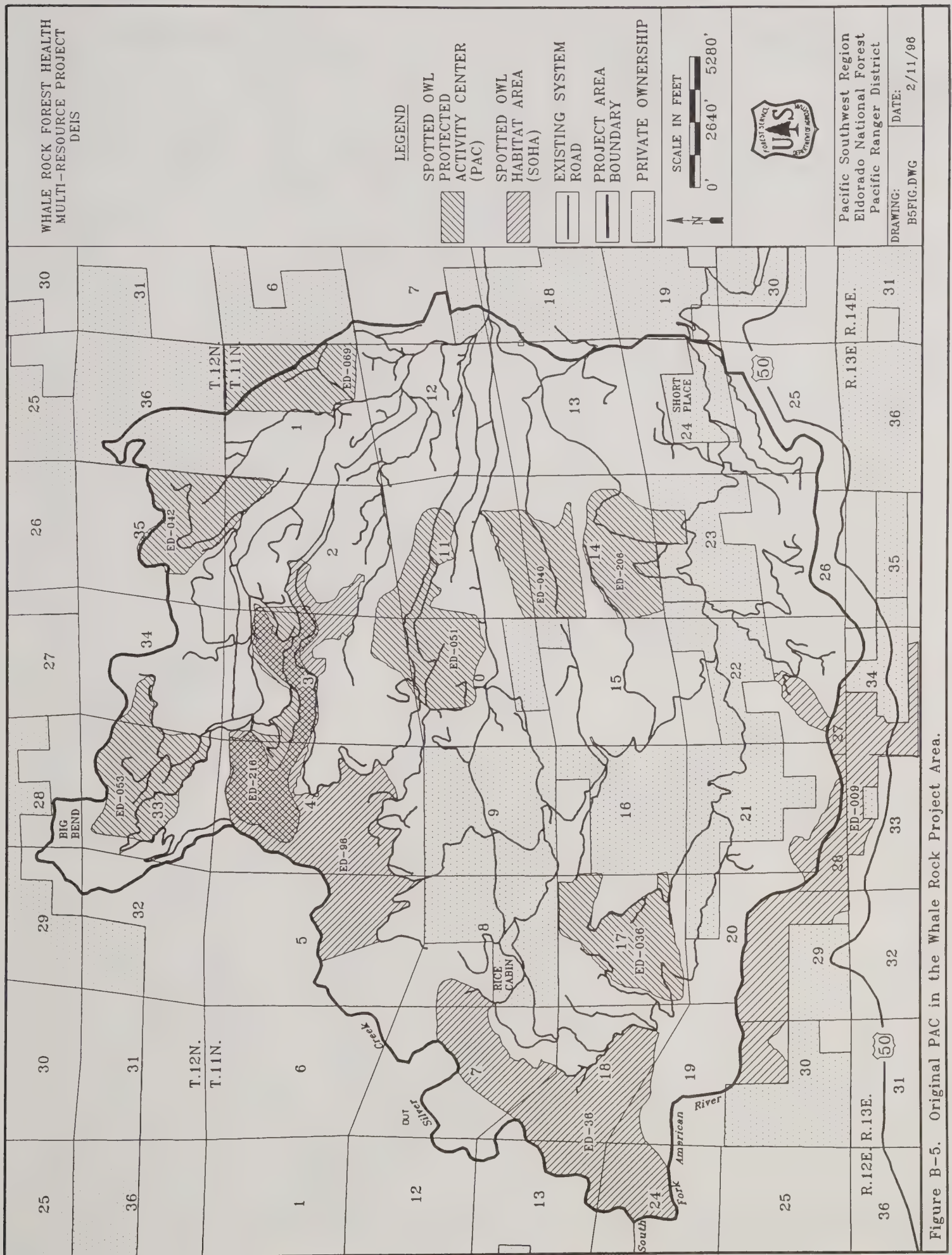


Figure B-5. Original PAC in the Whale Rock Project Area.



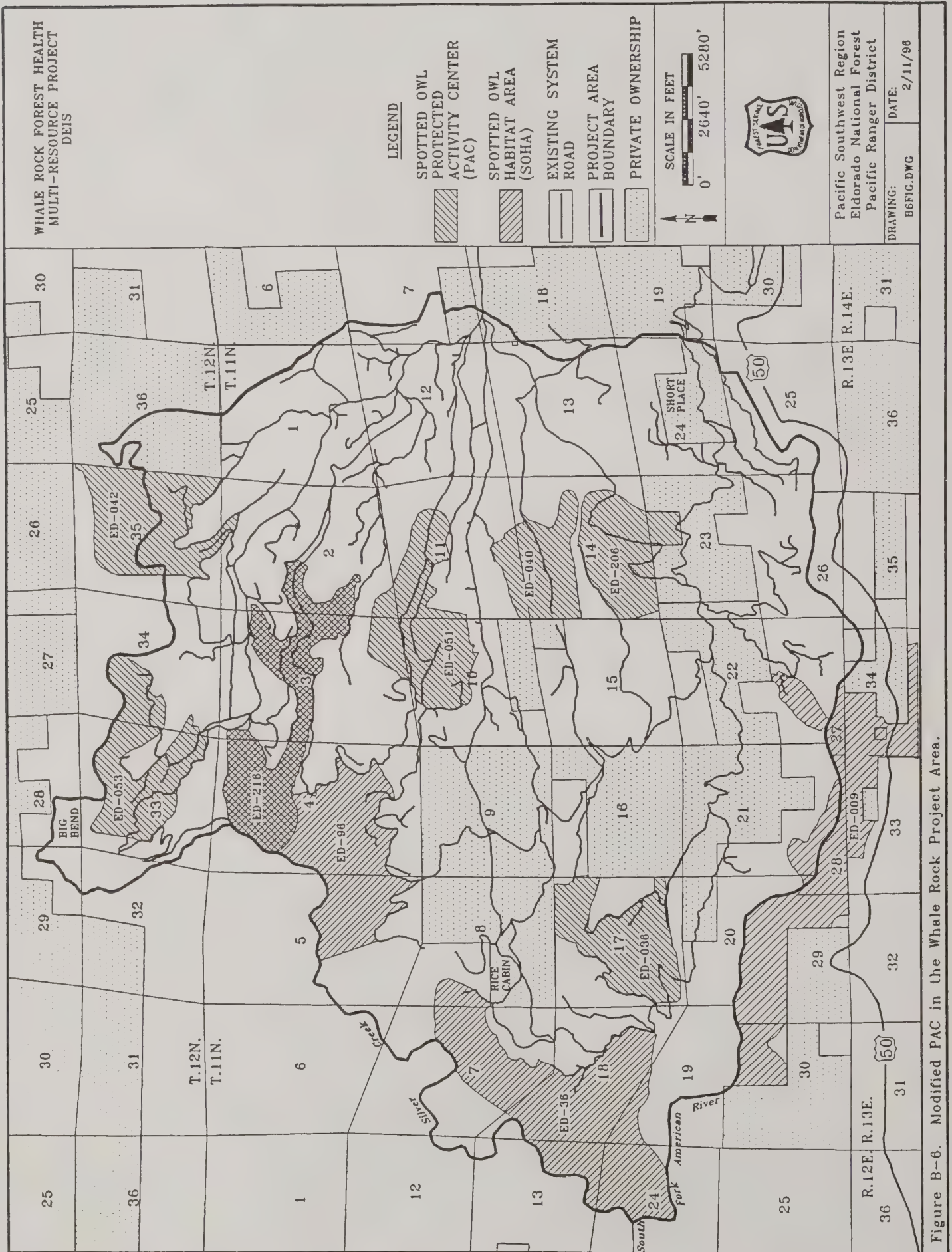
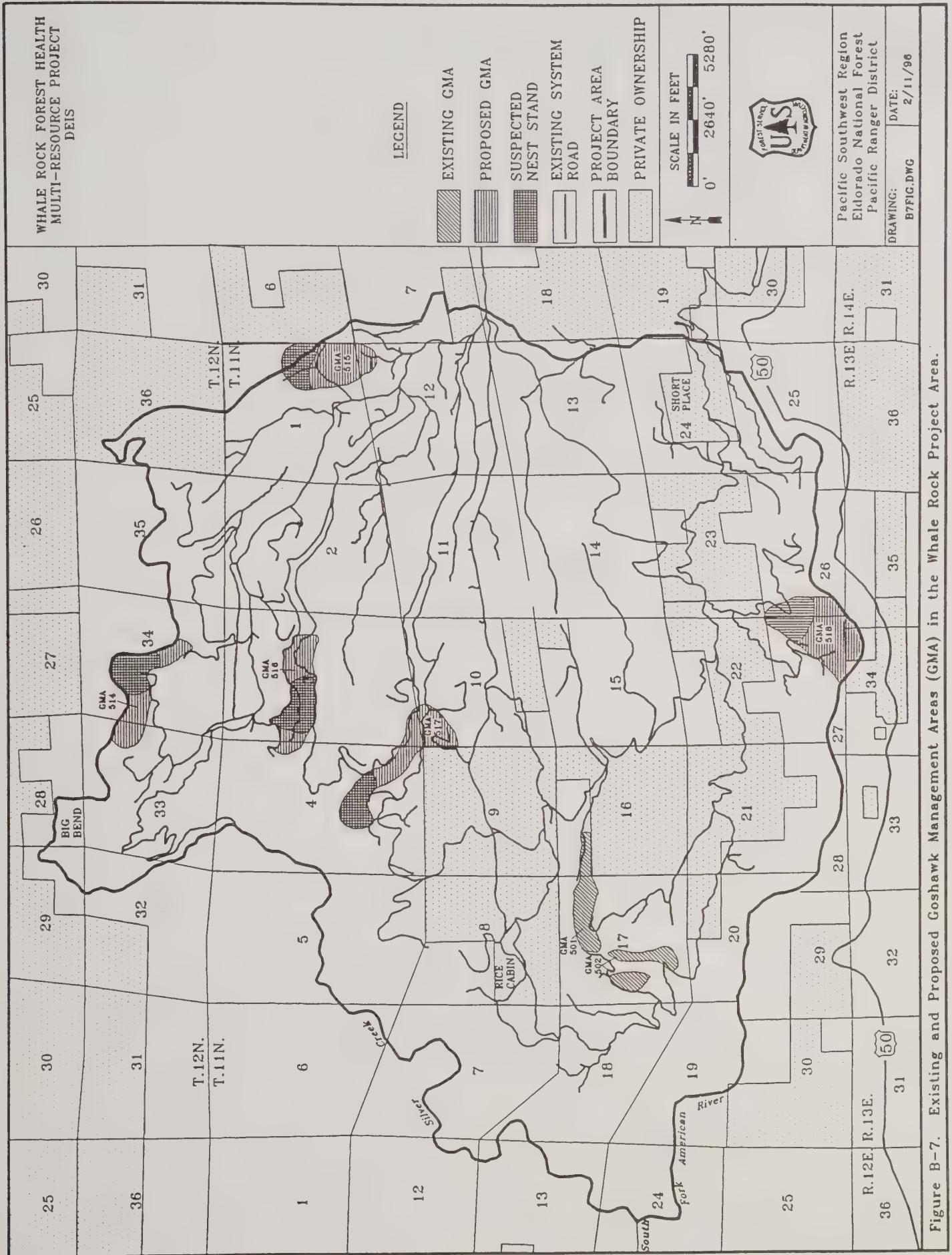


Figure B-6. Modified PAC in the Whale Rock Project Area.





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**APPENDIX C**

**STAND EXAM INFORMATION**

**FOR THE PROPOSED WHALE ROCK PROJECT**

**AND**

**ORIGIN OF HARVEST UNITS IN**

**ALTERNATIVE E**

ELDORADO NATIONAL FOREST

PACIFIC RANGER DISTRICT



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## APPENDIX C

### STAND EXAM INFORMATION

This appendix contains information pertinent to the proposed harvest prescriptions that have been generally discussed in the main document. Numerical data is presented in table format. A summary statement is also included in compliance with the National Forest Management Act (NFMA). The NFMA compliance statement is a summary of findings concerning specific aspects of this project as ascertained by a certified silviculturist.

This stand exam information was developed from the stand surveys that were conducted on more than 3,000 acres of lands within the Whale Rock Project Area. The following tables include information on the existing stand conditions, the expected post-harvest conditions and the diameter cutting limits that will achieve the predicted post-harvest condition for the preferred Alternative (E) for the natural stands, including fuelbreaks. Similar data has been compiled for activities proposed within plantations and this information is available in the planning record, but is not included here. Data from these tables will be extracted to develop the specific marking guidelines that will be implemented to achieve the stated objectives.

The tables and table contents contained in this appendix are as follows:

- Tables A and B: These two tables list the existing stand parameters including stand strata, the acreage sampled, and the basal area/acre. These tables also identify existing snags per acre and average quadratic mean DBH of all trees within the stand (QM DBH Total) and the quadratic mean DBH of predominant, dominant and codominant trees only (QM DBH P,D,C). This information is used in assigning a particular stand to a timber strata size class.
- Tables C and D: These tables contain a comparison of the planned basal area per acre proposed for retention versus the minimum basal area retention that the CASPO guidelines require is included. It is expected that the basal area actually retained in the proposed harvest units would approximate the projected retention level; however, since these values are based on a sample of the stand conditions, some variation could be expected. In all cases the limits defined as "CASPO Retention" would be the controlling limit.
- Tables E and F: These tables summarize by stand the DBH limit of trees to be harvested and an estimate of the volume per acre and volume per unit that would be harvested. The volume per acre to be harvested is based on estimates of potential harvest trees that were made at the time the stand exam plots were being measured. The DBH limit defines the maximum diameter of any tree that would be considered for harvest. This information is based on stand exams and varies among stands based upon individual stand characteristics. In most cases many trees smaller than the DBH limit would be

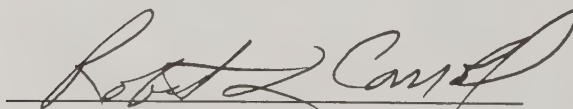
retained. Selection of retention trees below the DBH limit would be based on species, spacing, tree condition and basal area objectives displayed in Tables A and B.

- Table G: This table displays the origin of units included in Alternative E.

### NFMA COMPLIANCE STATEMENT

Based on field reviews and data analysis, I recommend the following findings of facts, pursuant to NFMA, be made in project decisions for the Whale Rock Forest Health Multi-Resource Project:

- 1) There is reasonable assurance that if prescriptions are implemented as described herein:
  - a. Soil, slope or other watershed conditions will not be irreversibly damaged.
  - b. Protection will be provided for streams and streambanks. Water temperatures and sedimentation will not be adversely increased.
- 2) I further find that:
  - a. All lands in the areas proposed for harvest are suitable for timber production.
  - b. The volume to be sold is part of the allowable sale quantity (ASQ) identified in the Eldorado Forest Plan.
  - c. NOTE: There are no regeneration prescriptions planned for this project, therefore statements concerning regeneration prescriptions are not applicable on this project.



Date: 2-29-96

Robert L. Carroll  
Silviculturist



TABLE A

## Unit Summary Data (Natural Stands)

Unit	Strata	Acres	BA/A Sq.Ft.	Vol/A MBF	Snags/A	QM DBH Total	QM DBH P.D.C	% Crown Closure
NATA	M3N	88.5	166	20.2	3	10	21	49
NATB	M3N	33.5	185	26.9	85	12	20	49
NATC	M3N	24.9	188	23.7	14	15	21	48
NATD	M3N	21.7	167	15.9	13	15	18	40
NATE	M3N	44.5	222	21.6	11	12	19	56
NATF	M3N	58.4	260	34.0	65	15	19	56
NATG	M3N	39.4	240	19.5	10	9	20	65
NATH	M4N	37.8	171	14.4	8	16	24	57
NATI	M3N	105.2	229	26.7	18	14	21	51
NATJ	M3P	26.7	129	12.6	15	13	20	41
NATK	M3N	67.7	263	22.2	95	12	20	64
NATL	M3G	34.1	373	26.7	0	12	16	84
NATM	M3N	116.0	236	29.6	41	15	20	59
NATN	M3N	72.7	280	34.2	13	14	22	61
NATO	M3G	85.3	309	29.1	15	11	18	83
NATP	M3N	30.7	190	8.8	0	11	17	62
NATQ	M3N	113.6	235	28.6	8	12	17	60
NATR	M3G	17.8	304	28.4	19	12	18	75
NATS	M3G	27.3	247	28.1	0	13	16	75
NATT	M3N	19.8	273	34.4	4	14	24	65
NATU	M3G	20.9	227	9.2	7	7	17	79
NATV	M3G	43.7	276	18.8	29	11	19	82
NATW	M3G	127.9	213	10.1	11	7	17	75
NATX	M3N	24.4	213	21.5	1	14	21	60
NATY	M3G	5.9	300	10.5	6	8	12	83
NATZ	M3G	88.7	300	16.0	24	9	16	91
NATAA	M3N	15.6	264	25.3	17	12	16	64
NATBB	M3G	39.6	207	17.2	3	10	22	75
NATCC	M3G	58.0	343	25.2	80	10	18	86
NATDD	M4N	12.3	340	81.5	4	12	31	69
NATEE	M3G	14.8	280	16.3	4	11	19	71
NATFF	M3N	12.9	250	26.5	2	14	16	54
NATGG	M3N	31.3	152	23.0	16	17	22	43
NATHH	M3N	57.1	171	18.1	19	12	23	58
NATII	M3N	91.2	211	19.6	11	12	14	59
NATJJ	M3N	13.5	270	39.7	11	13	23	65
NATKK	M3G	12.0	270	24.6	0	8	18	85
NATLL	M3N	8.3	267	32.5	3	14	21	65
NATMM	M3N	20.1	260	35.0	14	15	22	66
NATNN	M4N	5.4	200	40.9	32	16	24	48
NATOO	M3N	19.3	290	45.6	7	17	22	68
NATPP	M4N	62.7	193	23.1	1	13	25	57
NATQQ	M4N	51.7	229	33.0	1	18	31	55
NATRR	M3N	17.2	190	29.1	10	19	23	54
NATSS	M3N	36.6	216	29.6	3	15	19	57
NATTT	M3N	19.0	230	32.9	20	15	19	63
NATUU	M3N	2.7	200	13.1	4	11	17	63
NATVV	M3N	30.0	206	19.8	6	11	22	62
NATWW	M3N	45.0	151	9.8	8	13	17	57
NATXX	M4N	5.2	280	52.4	3	21	31	56
NATYY	M4N	22.8	180	32.5	4	19	36	46
NATZZ	M4N	7.7	196	36.4	8	19	28	43
NATAAA	M4G	58.8	169	20.4	2	14	25	77
NATBBB	M3N	26.0	177	20.2	3	17	18	63
NATCCC	M4N	15.7	327	53.8	9	15	24	62
NATDDD	M3N	13.4	189	17.9	12	14	17	52
Totals		2203.0	510857	52722.4	41079			
Avg (Wt)			234	26.2	15	13	21	63

**TABLE B**

## Unit Summary Data (Fuelbreaks)

Unit	Strata	Acres	Unit BA/A	Unit Vol/A	Snags/A	QM DBH Total	QM DBH P,D,C	% Crown Closure
BBFB	M2G	353.5	229	12.9	61	8	20	75
BVFB1	M4N	8.1	240	50.4	2	24	26	53
JBFB1	M2N	138.1	210	19.3	14	11	19	59
JBFB2	M2G	7.7	160	12.6	12	9	17	78
JBFB3	M3N	59.2	190	16.3	11	13	16	54
PVFB1-2	M2N	262.6	137	9.9	5	11	15	45
PVFB3	M3G	7.5	193	9.4	0	12	18	66
PVFB4	M4N	29.5	245	32.4	12	15	27	56
TPFB1	M3N	47.8	175	10.4	7	9	19	56
Totals		914.0	177405	12810.1	26199			
Avg (Wt)			178	17.3	12	11	18	54

TABLE C

## Basal Area Retention and Reduction (Natural Stands)

Unit	Strata	Acres	Unit BA/A	Proposed Retention	Percent Reduction	CASPO Retention	Percent Reduction
NATA	M3N	88.5	166	57	66	50	70
NATB	M3N	33.5	185	95	49	56	70
NATC	M3N	24.9	188	88	53	56	70
NATD	M3N	21.7	167	40	76	50	70
NATE	M3N	44.5	222	151	32	67	70
NATF	M3N	58.4	260	120	54	78	70
NATG	M3N	39.4	240	160	33	72	70
NATH	M4N	37.8	171	123	28	69	60
NATI	M3N	105.2	229	127	44	69	70
NATJ	M3P	26.7	129	76	41	50	61
NATK	M3N	67.7	263	142	46	79	70
NATL	M3G	34.1	373	240	36	112	70
NATM	M3N	116.0	257	177	31	77	70
NATN	M3N	72.7	280	164	41	84	70
NATO	M3G	85.3	309	166	46	92	70
NATP	M3N	30.7	190	100	47	57	70
NATQ	M3N	113.6	235	130	45	71	70
NATR	M3G	17.8	304	176	42	91	70
NATS	M3G	27.3	247	93	62	74	70
NATT	M3N	19.8	273	153	44	82	70
NATU	M3G	20.9	227	93	59	68	70
NATV	M3G	43.7	276	178	35	83	70
NATW	M3G	127.9	213	100	53	64	70
NATX	M3N	24.4	213	167	22	64	70
NATY	M3G	5.9	300	110	63	90	70
NATZ	M3G	88.7	300	173	42	90	70
NATAA	M3N	15.6	264	96	64	79	70
NATBB	M3G	39.6	207	127	39	62	70
NATCC	M3G	58.0	343	212	38	103	70
NATDD	M4N	12.3	340	210	38	136	60
NATEE	M3G	14.8	280	137	51	84	70
NATFF	M3N	12.9	250	210	16	75	70
NATGG	M3N	31.3	152	112	26	50	67
NATHH	M3N	57.1	171	113	34	51	70
NATII	M3N	91.2	211	120	43	63	70
NATJJ	M3N	13.5	270	140	48	81	70
NATKK	M3G	12.0	270	130	52	81	70
NATLL	M3N	8.3	267	207	22	80	70
NATMM	M3N	20.1	260	220	15	78	70
NATNN	M4N	5.4	200	160	20	80	60
NATOO	M3N	19.3	290	200	31	87	70
NATPP	M4N	62.7	193	137	29	77	60
NATQQ	M4N	51.7	229	207	10	92	60
NATRR	M3N	17.2	190	140	26	57	70
NATSS	M3N	36.6	216	116	46	65	70
NATTT	M3N	19.0	230	120	48	69	70
NATUU	M3N	2.7	200	180	10	60	70
NATVV	M3N	30.0	206	143	31	62	70
NATWW	M3N	45.0	151	120	21	50	67
NATXX	M4N	5.2	280	227	19	112	60
NATYY	M4N	22.8	180	127	30	72	60
NATZZ	M4N	7.7	196	136	31	78	60
NATAAA	M4G	58.8	169	139	18	68	60
NATBBB	M3N	26.0	177	137	23	53	70
NATCCC	M4N	15.7	327	180	45	131	60
NATDDD	M3N	13.4	189	123	35	57	70
Totals		2203.0	513304	305946		1030524	
Avg (Wt)			234	143	38	446	



TABLE D

## Basal Area Retention and Reduction (Fuelbreaks)

Unit	Strata	Acres	Unit BA/A	Proposed Retention	Percent Reduction	CASPO Retention	Percent Retention
BBFB	M2G	353.5	229	57	75	69	70
BVFB1	M4N	8.1	240	173	28	96	60
JBFB1	M2N	138.1	210	57	73	N/A	N/A
JBFB2	M2G	7.7	160	60	63	50	69
JBFB3	M3N	59.2	190	85	55	57	70
PVFB1-2	M2N	262.6	137	60	56	N/A	N/A
PVFB3	M3G	7.5	193	93	52	58	70
PVFB4	M4N	29.5	245	160	35	98	60
TPFB1	M3N	47.8	175	80	54	52	70
Totals		914.0	177405	59966		101953	
Avg (Wt)			178	82	55	93	

TABLE E

## Harvest Volumes (Natural Stands)

Unit	Strata	Acres	Vol/A MBF	DBH	CASPO	Harvest Level	
				Limit	Vol/A	Vol/A	Vol/Unit
NATA	M3N	88.5	20.2	20	6.6	6.6	584.1
NATB	M3N	33.5	26.9	22	11.7	5.0	167.5
NATC	M3N	24.9	23.7	21	13.9	11.2	278.9
NATD	M3N	21.7	15.9	18	6.8	6.8	147.6
NATE	M3N	44.5	21.6	21	13.8	6.3	280.4
NATF	M3N	58.4	34.0	17	17.6	15.6	911.0
NATG	M3N	39.4	19.5	18	7.3	2.8	110.3
NATH	M4N	37.8	14.4	21	3.7	2.4	90.7
NATI	M3N	105.2	26.7	24	16.7	9.6	1009.9
NATJ	M3P	26.7	12.6	18	2.8	2.8	74.8
NATK	M3N	67.7	22.2	19	8.8	5.6	379.1
NATL	M3G	34.1	26.7	17	10.8	5.5	187.6
NATM	M3N	116.0	29.6	21	10.1	4.7	545.2
NATN	M3N	72.7	34.2	22	13.1	7.6	552.5
NATO	M3G	85.3	29.1	19	8.0	8.0	682.4
NATP	M3N	30.7	8.8	15	7.8	4.4	135.1
NATQ	M3N	113.6	28.6	17	10.1	6.5	738.4
NATR	M3G	17.8	28.4	17	8.9	4.3	76.5
NATS	M3G	27.3	28.1	16	13.1	9.5	259.4
NATT	M3N	19.8	34.4	24	15.3	9.6	190.1
NATU	M3G	20.9	9.2	14	2.2	1.9	39.7
NATV	M3G	43.7	18.8	18	5.3	4.3	187.9
NATW	M3G	127.9	10.1	14	3.2	1.6	204.6
NATX	M3N	24.4	21.5	22	9.4	1.7	41.5
NATY	M3G	5.9	10.5	12	4.5	4.5	26.6
NATZ	M3G	88.7	16.0	16	5.3	3.9	345.9
NATAA	M3N	15.6	25.3	16	8.7	8.7	135.7
NATBB	M3G	39.6	17.2	19	6.2	6.2	245.5
NATCC	M3G	58.0	25.2	17	8.2	4.1	237.8
NATDD	M4N	12.3	81.5	30	32.4	18.8	231.2
NATEE	M3G	14.8	16.3	18	8.0	6.0	88.8
NATFF	M3N	12.9	26.5	21	9.3	1.2	15.5
NATGG	M3N	31.3	23.0	22	11.6	4.8	150.2
NATHH	M3N	57.1	18.1	24	9.1	4.0	228.4
NATII	M3N	91.2	19.6	20	7.2	3.6	328.3
NATJJ	M3N	13.5	39.7	24	15.5	14.0	189.0
NATKK	M3G	12.0	24.6	16	8.0	5.9	70.8
NATLL	M3N	8.3	32.5	22	14.9	5.8	48.1
NATMM	M3N	20.1	35.0	24	22.4	6.4	128.6
NATNN	M4N	5.4	40.9	22	19.4	3.5	18.9
NATOO	M3N	19.3	45.6	24	29.4	11.0	212.3
NATPP	M4N	62.7	23.1	23	12.4	5.4	338.6
NATQQ	M4N	51.7	33.0	30	12.9	0.5	25.9
NATRR	M3N	17.2	29.1	30	14.8	5.4	92.9
NATSS	M3N	36.6	29.6	22	11.4	7.7	281.8
NATTT	M3N	19.0	32.9	27	11.7	10.2	193.8
NATUU	M3N	2.7	13.1	15	6.1	1.7	4.6
NATVV	M3N	30.0	19.8	23	8.6	1.8	54.0
NATWW	M3N	45.0	9.8	23	3.9	1.0	45.0
NATXX	M4N	5.2	52.4	29	24.7	5.7	29.6
NATYY	M4N	22.8	32.5	28	12.4	4.8	109.4
NATZZ	M4N	7.7	36.4	25	12.2	6.5	50.1
NATAAA	M4G	58.8	20.4	25	6.3	1.3	76.4
NATBBB	M3N	26.0	20.2	25	8.4	3.0	78.0
NATCCC	M4N	15.7	53.8	19	18.1	13.9	218.2
NATDDD	M3N	13.4	17.9	20	8.2	4.3	57.6
Totals		2203.0	52722				12233
Avg (Wt)			26.2	21	11	6	

TABLE F

## Harvest Volumes (Fuelbreaks)

Unit	Strata	Acres	Vol/A MBF	DBH	CASPO	Harvest Level	
				Limit	Vol/A	Vol/A	Vol/Unit
BBFB	M2G	353.5	12.9	17	5.7	5.7	2015.0
BVFB1	M4N	8.1	50.4	26	17.4	17.4	140.9
JBFB1	M2N	138.1	19.3	23	19.3	11.0	1519.1
JBFB2	M2G	7.7	12.6	15	3.8	3.8	29.3
JBFB3	M3N	59.2	16.3	21	6.8	6.8	402.6
PVFB1-2	M2N	262.6	9.9	18	9.9	5.0	1313.0
PVFB3	M3G	7.5	9.4	17	4.4	4.4	33.0
PVFB4	M4N	29.5	32.4	27	13.7	13.4	395.3
TPFB1	M3N	47.8	10.4	18	6.0	6.0	286.8
Totals		914.0	12810.1				6135
Avg (Wt)			19.3	20	10	8	



**TABLE G**

The following table displays the origins of the units that were integrated into Alternative E.

<b>Table G. Origin of Harvest Units in Alternative E.</b>			
	<b>Alternative B</b>	<b>Alternative C</b>	<b>Alternative D</b>
<b>Unit #</b>	<b>Fuels Emphasis</b>	<b>Wildlife Emphasis</b>	<b>Timber Emphasis</b>
A	xx	xx	xx
B	xx	xx	xx
C	xx	xx	
D	xx	xx	
E	xx	xx	
F	xx	xx	xx
G	xx	xx	xx
H	xx	xx	
I	xx	xx	xx
J	xx	xx	
K	xx	xx	
L	xx		
M	xx	xx	xx
N	xx	xx	xx
O	xx	xx	
P		xx	
Q	xx	xx	xx
R	xx	xx	xx
S	xx	xx	xx
T	xx	xx	
U			xx
V	xx		xx
W	xx		
X	xx		
Y	xx	xx	
Z	xx	xx	xx
AA			xx
BB		xx	
CC		xx	
DD			xx
EE	xx		
FF	xx		xx
GG	xx		xx
HH	xx	xx	
II	xx		xx
JJ	xx		
KK			xx
LL	xx	xx	
MM		xx	
NN	xx		
OO	xx		
PP	xx		
QQ	xx		
RR			xx
SS	xx	xx	xx
TT			xx
UU			xx
VV			xx
WW			xx
XX	xx		
YY			xx
ZZ	xx		
AAA	xx		
BBB	xx		
CCC	xx		
DDD	xx	xx	xx

*Please use this page for notes.*

## **APPENDIX D**

### **TRANSPORTATION REPORT**

#### **FOR**

### **WHALE ROCK FOREST HEALTH MULTI-RESOURCE PROJECT**

PACIFIC RANGER DISTRICT

ELDORADO NATIONAL FOREST

JANUARY, 1995



*Please use this page for notes.*

## APPENDIX D

### TRANSPORTATION REPORT

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## **Whale Rock Forest Health Multi-Resource Project Transportation Plan**

### **1. Transportation System Narrative**

The Whale Rock Project area is accessed by one major arterial and four collector roads. The arterial 17N12 (Soda Springs Riverton) is a double lane paved El Dorado county road, #147. The collector roads, 11N55.1, 11N60.1, and 11N65 are single lane chip sealed roads. 11N63 is a native surface road with some spot surfacing. 11N65 (White Meadows) is an El Dorado County road, #1041.

Surface replacement deposits will be required for commercial haul on 11N55.1 and 11N60.1.

The remaining roads to be used for the sale are low standard, native surface local roads. The projected traffic volumes and mixes for the project indicate that these single lane roads will safely accommodate the traffic volume with the use of traffic restrictions. The roads should be closed to the public during operating periods to insure safe travel.

There are approximately 98 miles of existing system road within the Whale Rock project area. New construction road varies by alternative with Alternative B having 1.7 miles, Alternative C having 1.0 miles, Alternative D having 1.6 miles and Alternative E having 2.2 miles. Reconstruction road also varies by alternative with Alternative B having 29.3 miles, Alternative C having 19.2 miles, Alternative D having 14.9 miles and Alternative E having 32.1 miles.

### **2. Rights-of-Way and Cooperative Road Cost Share Agreements**

- . All road right-of-ways needed for the project have been previously acquired.

There is no planned new or reconstruction on any Sierra Pacific Industries (formerly Michigan California Lumber Company) coop roads being used for the project. There may be a need for an agreement with SPI to use their direct draft water source at the double culvert on the South Fork of Silver Creek off of 11N14Y if it is decided that this source is needed. There may also be a need for an agreement for use of their water sources on 11N65 as described below.

### **3. Water Sources**

11N65 crosses two drainages in the SW1/4 of Section 19, T11N, R14E on Mich-Cal property. Both of these drainages have concrete headwalls and wingwalls. In the past, Mich-Cal has used these drainages for water sources by partially blocking the entrance with plywood. Water ponds behind the culverts and the water trucks draft the water



while positioned on the road. These are potential water sources for the southern portion of the project area but the Forest Service would need an agreement from Sierra Pacific Industries to use them.

There is a developed water hole on 17N12YA just off of the Soda Springs Riverton road near the Weber Mill road intersection.

There is a water source at the Jaybird tunnel adit.

There is a developed water hole, coop with SPI, on 11N55C at Chicken Hawk Spring.

There is a direct draft source off of 11N14Y at the double culvert crossing of the South Fork of Silver Creek. This is one of SPI's mainline roads and an agreement would be needed from them for its use.

#### 4. Haul Route Summary

Haul of multi products from the sale area would be via the four collector roads, 11N55.1, 11N60.1, 11N63 and 11N65 to the arterial 17N12 to Highway 50.

# WHALE ROCK

## Road Costs and Miles

ROAD MILES	ALTERNATIVE			
	B	C	D	E
New Construction	1.67	1.03	1.57	2.2
Reconstruction	29.30	19.21	14.93	32.1
Maintenance	50.40	54.92	46.60	48.5
TOTAL MILES	81.37	75.16	63.10	75.2
<b>COSTS</b>				
New Construction	\$44,050	\$23,850	\$42,150	\$56,600
Reconstruction	\$883,075	\$517,450	\$382,570	\$919,185
<b>TOTAL COSTS</b>	\$927,125	\$541,300	\$427,720	\$975,785

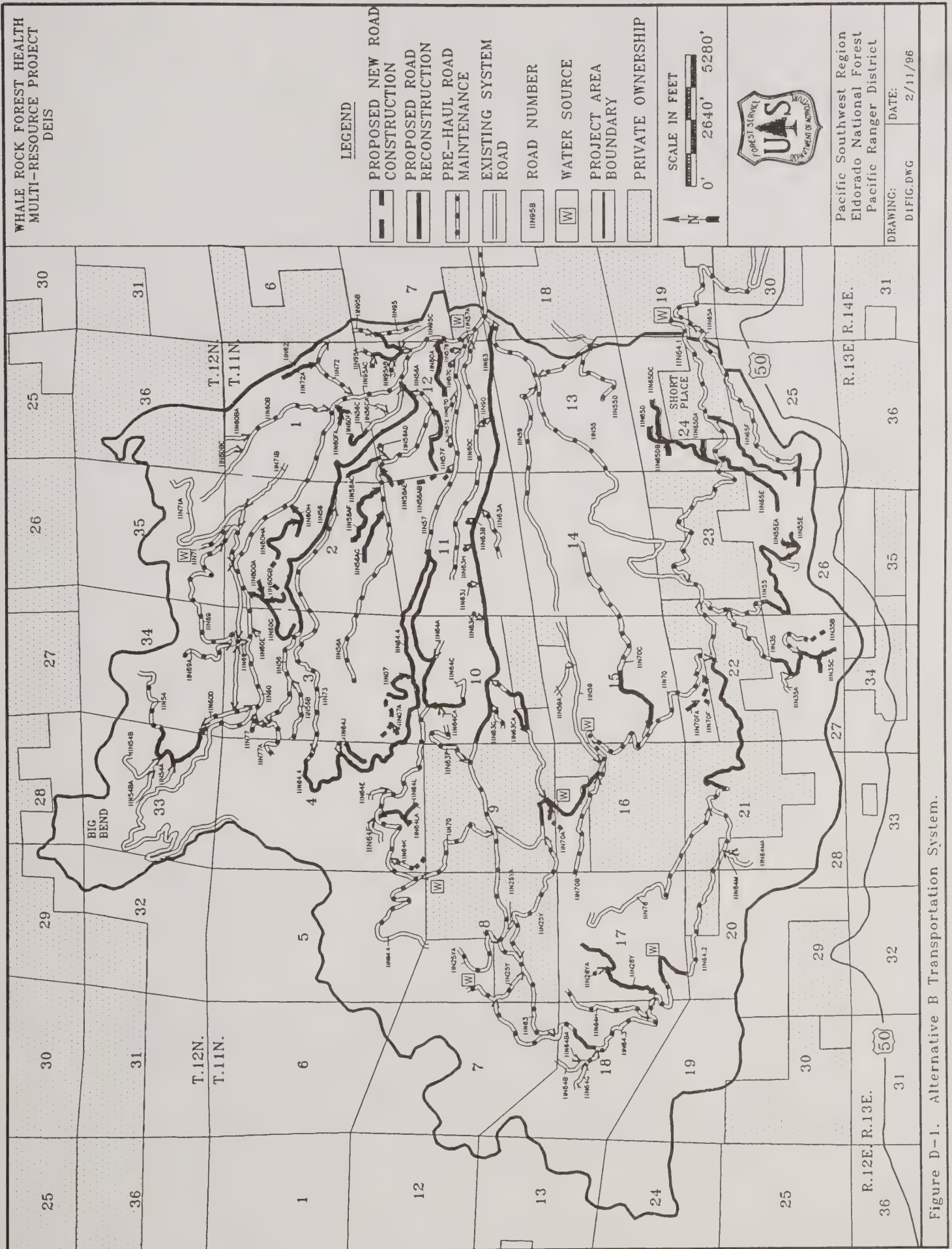


Figure D-1. Alternative B Transportation System.



Alternative: B

## ROAD INFORMATION AND RECOMMENDATIONS

Section A  
Sheet 1 of 3

Timber Sale: WHALE ROCK MULTI PRODUCT District: PACIFIC Volume: 22.4 MMBF sawtimber  
67.2 M tons biomass Date: 2-96

ROAD NUMBER	ROAD NAME	ROAD STD. SPEED	M I L E S				R/W NEEDS	COOP STATUS	SALE	MAINT POST	LEVEL SALE	FUNCTIONAL CLASS	SERVICE LEVEL	COSTS	
			NEW CONST.	RECONST.	MAINT.									CONST	--- RECONST
11N07	Pup Tent	S-5	0.42	0.50					4	4	2	Local	D	\$ 14,700	\$ 2,500
11N07A	Pup Tent East	S-5	0.06						4	4	1	Local	D	\$ 900	
11N35	Vleck Creek	S-5		0.65	0.55				4	4	2	Local	D		\$ 30,000
11N35B	Van Hausen	S-5	0.18		0.26				4	4	1	Local	D	\$ 4,500	
11N35C	Vleck South	S-5		0.15					4	4	1	Local	D		\$ 7,145
11N54	Bend	S-5		0.75	0.77				4	4	2	Local	D		\$ 30,000
11N55.1	Peavine Ridge	S-10			1.60				4	4	4	Collector	C		
11N55.2	Peavine Ridge	S-10			0.65				4	4	2	Collector	D		
11N55.3	Peavine Ridge	S-5		0.95					4	4	2	Local	D	\$ 40,250	
11N55.4	Peavine Ridge	S-5			1.00				4	4	2	Local	D		
11N55B	Chicken Hawk Sprg	S-5			0.20				4	4	2	Local	D		
11N55C	Chicken Trough	S-5			0.10				4	4	1	Local	D		
11N55D	Peahen	S-5			1.10				4	4	1	Local	D		
11N55E	Brock	S-5		0.30					4	4	1	Local	D	\$ 9,750	
11N55EA	Brock Spur	S-5		0.14					4	4	1	Local	D	\$ 1,435	
11N56	Jaybird Canyon	S-5		2.36					4	4	2	Local	D	\$ 98,400	
11N56A	Side Canyon	S-5		2.75					4	4	1	Local	D		
11N56AB	Side Cyn B	S-5	0.19	0.57					4	4	1	Local	D	\$ 4,750	\$ 5,700
11N56AC	Side Cyn C	S-5		0.41					4	4	1	Local	D	\$ 3,100	
11N56AD	Side Cyn D	S-5			0.05				4	4	1	Local	D		
11N56AE	Side Cyn E	S-5	0.13	0.16					4	4	1	Local	D	\$ 3,150	\$ 1,200
11N56AF	Side Cyn F	S-5		0.57					4	4	1	Local	D	\$ 4,275	
11N56AG	Side Cyn G	S-5		0.42					4	4	1	Local	D	\$ 4,200	
11N56B	Bowl Spur	S-5			0.51				4	4	1	Local	D		
11N56C	Jbird	S-5		0.25	0.48				4	4	1	Local	D	\$ 1,875	
11N56CA	Jbird CA	S-5			0.12				4	4	1	Local	D		
11N57	Roundtent Canyon	S-15			1.60				4	4	4	Local	D		
11N57A	Roundtent Waterholes	S-15			0.10				4	4	1	Local	D		
11N57B	Roundtent One	S-5			0.06				4	4	1	Local	D		
11N57C	Roundtent Two	S-5			0.04				4	4	1	Local	D		
11N57D	Roundtent Three	S-5			0.20				4	4	1	Local	D		
11N57E	Roundtent Four	S-5			0.03				4	4	1	Local	D		
11N57F	Roundtent Five	S-5	0.08		0.06				4	4	1	Local	D	\$ 800	
11N59	Soldier Creek	S-5			1.20				Supp#19 SPI 4	4	2	Local	D		

Sheet 2 of 3

11N60.1	Jaybird Spring	S-15	SN-16	5.30		Supp#32 SPI 4	4	Collector	C		
11N60A	Cedar Spring	S-5	SL-14	0.51		4	1	Local	D	\$ 3,800	
11N60B	Jaybird North	S-5	SL-14	1.04		4	1	Local	D		
11N60C	Tent Canyon	S-5	SL-14	1.95		4	1	Local	D		
11N60D	Jolt	S-5	SL-14	0.40		4	1	Local	D		
11N60E	Jade East	S-5	SL-14	0.08		4	1	Local	D		
11N60F	Upper Jaybird	S-5	SL-14	0.12		4	1	Local	D	\$ 1,820	
11N60FA	Upper Jaybird W	S-5	SL-14	0.11		4	1	Local	D	\$ 1,100	
11N60G	Jay Gee	S-5	SL-14	0.64		4	1	Local	D	\$ 4,800	
11N60GA	Jay Gee A	S-5	SL-14	0.15		4	1	Local	D	\$ 1,125	
11N60GB	Jay Gee B	S-5	SL-14	0.23	0.11	4	1	Local	D	\$ 2,750	\$ 1,725
11N60H	Jaybird H	S-5	SL-14	0.28		4	1	Local	D	\$ 2,800	
11N60HA	Jaybird HA	S-5	SL-14	0.51	0.09	4	1	Local	D	\$ 2,250	\$ 5,100
11N63	West Peavine Ridge	S-10	SL-14	3.21		Supp#19 SPI 4	3	Collector	C	\$ 136,400	
11N63A	South Soldier	S-5	SL-14	0.45		4	1	Local	D		
11N63B	Peavine One	S-5	SL-14	0.03		4	1	Local	D		
11N63C	North Allen	S-5	SL-12	0.38		Supp#19 SPI 4	1	Local	D	\$ 49,200	
11N63CA	North Allen Spur	S-5	SL-14	0.18		4	1	Local	D	\$ 2,000	
11N63F	Silver Pea	S-5	SL-14	0.65		Supp#51 SPI 4	2	Local	D		
11N63G	North Soldier	S-5	SL-14	0.24		4	1	Local	D		
11N63H	Peavine Two	S-5	SL-14	0.03		4	1	Local	D		
11N63J	Peavine Three	S-5	SL-14	0.09		4	1	Local	D		
11N63K	Peavine Four	S-5	SL-14	0.05		4	1	Local	D		
11N64.1	Spring Valley	S-10	SL-14	1.50		Supp#19 SPI 4	3	Local	D	\$ 60,000	
11N64.2	Spring Valley	S-10	SL-14	0.60		4	3	Local	D	\$ 24,000	
11N64.3	Spring Valley	S-10	SL-14	0.90		4	2	Local	D		
11N64.4	Spring Valley	S-10	SL-14	0.31		4	2	Local	D	\$ 169,600	
11N64B	Peavine End	S-5	SL-14	0.59		4	1	Local	D		
11N64BA	Pea Spur	S-5	SL-14	0.04		4	1	Local	D		
11N64C	Silver Tip	S-5	SL-14	0.56		4	1	Local	D	\$ 22,400	
11N64CA	Silver Tip Top	S-5	SL-14	0.07		4	1	Local	D		
11N64G	Silver Point	S-5	SL-14	0.22		4	1	Local	D		
11N64H	Tie Rod	S-5	SL-14	0.84		4	1	Local	D		
11N64J	Round Tuit	S-5	SL-14	0.15		4	1	Local	D	\$ 2,200	
11N64K	Tent Stake	S-5	SL-14	0.21	0.16	4	1	Local	D	\$ 4,000	
11N64L	Round Steak	S-5	SL-14	0.40		4	1	Local	D	\$ 3,050	
11N64LA	Round Steak 2	S-5	SL-14	0.06		4	1	Local	D	\$ 500	

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Section B  
Sheet 1 of 3

Date: 2-96

ROAD INFORMATION AND RECOMMENDATIONS

Alternative: B

Timber Sale: WHALE ROCK MULTI PRODUCT

District: PACIFIC

ROAD NUMBER	SURFACE STABILIZATION	HIGHWAY SAFETY ACT	DESIGN VEHICLE	ROAD CLOSURE METHOD	OHV DESIGNATION	R E M A R K S
11N07		N/A	Chip Van			
11N07A		N/A	Chip Van			
11N35	Spot Rock	N/A	Chip Van		4W, MC, ATV	
11N35B		N/A	Chip Van			
11N35C		N/A	Chip Van			
11N54	Spot Rock	N/A	Chip Van		4W, MC, ATV	
11N55.1	Chip Seal	Applies	Chip Van			
11N55.2		N/A	Chip Van			
11N55.3		N/A	Chip Van			
11N55.4	Spot Rock	N/A	Chip Van			
11N55B		N/A	Chip Van		4W, MC, ATV	
11N55C		N/A	Water Truck			
11N55D		N/A	Chip Van		MC, ATV	
11N55E		N/A	Chip Van			
11N55EA		N/A	Chip Van			
11N56	Spot Rock	N/A	Chip Van		4W, MC, ATV MC, ATV	
11N56A		N/A	Chip Van			
11N56AB		N/A	Chip Van			
11N56AC		N/A	Chip Van			
11N56AD		N/A	Chip Van			
11N56AE		N/A	Chip Van			
11N56AF		N/A	Chip Van			
11N56B		N/A	Chip Van			
11N56C		N/A	Chip Van		MC, ATV	
11N56CA		N/A	Chip Van			
11N57	Chip Seal	Applies	Chip Van			
11N57A		N/A	Chip Van			
11N57B		N/A	Chip Van			
11N57C		N/A	Chip Van			
11N57D		N/A	Chip Van			
11N57E		N/A	Chip Van			
11N57F		N/A	Chip Van			
11N59		N/A	Chip Van			

Sheet 2 of 3

11N60.1	Chip Seal	Applies	Chip Van		Existing coop with SPI (MC), supplement #32.
11N60A		N/A	Chip Van	MC,ATV	
11N60B		N/A	Chip Van	MC,ATV	
11N60C		N/A	Chip Van		
11N60D		N/A	Chip Van		
11N60E		N/A	Chip Van		
11N60F		N/A	Chip Van		
11N60FA		N/A	Chip Van		
11N60G		N/A	Chip Van		
11N60GA		N/A	Chip Van		
11N60GB		N/A	Chip Van		
11N60H		N/A	Chip Van		
11N60HA		N/A	Chip Van		
11N63	Chip Seal, Rock	Applies	Chip Van		Existing coop with SPI (MC), supplement #19.
11N63A		N/A	Chip Van		
11N63B		N/A	Chip Van		
11N63C	Spot Rock	N/A	Chip Van	MC,ATV	
11N63CA		N/A	Chip Van		
11N63F		N/A	Chip Van	4W,MC,ATV	
11N63G		N/A	Chip Van		
11N63H		N/A	Chip Van		
11N63J		N/A	Chip Van		
11N63K		N/A	Chip Van		
11N64.1	Spot Rock	N/A	Chip Van		
11N64.2	Spot Rock	N/A	Chip Van		
11N64.3		N/A	Chip Van		
11N64.4	Spot Rock	N/A	Chip Van	4W,MC,ATV	
11N64B		N/A	Chip Van	MC,ATV	
11N64BA		N/A	Chip Van		
11N64C	Spot Rock	N/A	Chip Van	MC,ATV	
11N64CA		N/A	Chip Van		
11N64G		N/A	Chip Van		
11N64H		N/A	Chip Van	MC,ATV	
11N64J		N/A	Chip Van	MC,ATV	
11N64K		N/A	Chip Van		
11N64L		N/A	Chip Van		
11N64LA		N/A	Chip Van		

Sheet 3 of 3

11N65	Chip Seal	Applies	Chip Van			Existing coop with SPI (MC), supplement #19.
11N65A		N/A	Chip Van	Gate		
11N65D		N/A	Chip Van	Gate	4W, MC, ATV	
11N65DA		N/A	Chip Van			
11N65DB		N/A	Chip Van			
11N65DC		N/A	Chip Van			
11N65E		N/A	Chip Van	Gate		
11N65F		N/A	Chip Van			
11N69		N/A	Chip Van	Gate?	4W, MC, ATV	
11N69A		N/A	Chip Van		4W, MC, ATV	
11N70	Spot Rock	N/A	Chip Van	Gate?	4W, MC, ATV	
11N70C	Spot Rock	N/A	Chip Van		4W, MC, ATV	Existing coop with SPI (MC), supplement #19.
11N70F		N/A	Chip Van		4W, MC, ATV	
11N70FA		N/A	Chip Van			
11N71		N/A	Chip Van	Gate?	4W, MC, ATV	
11N71A		N/A	Chip Van		4W, MC, ATV	
11N72		N/A	Chip Van		4W, MC, ATV	
11N72A	Spot Rock	N/A	Chip Van		4W, MC, ATV	
11N73		N/A	Chip Van		4W, MC, ATV	
11N77		N/A	Chip Van			
11N90		N/A	Chip Van			
11N95		N/A	Chip Van			
11N95A		N/A	Chip Van			
11N95AB		N/A	Chip Van			
11N95AC		N/A	Chip Van			
11N95C		N/A	Chip Van			
11N25YA		N/A	Chip Van			
11N26Y	Spot Rock	N/A	Chip Van			
17N12YA		N/A	Water Truck			



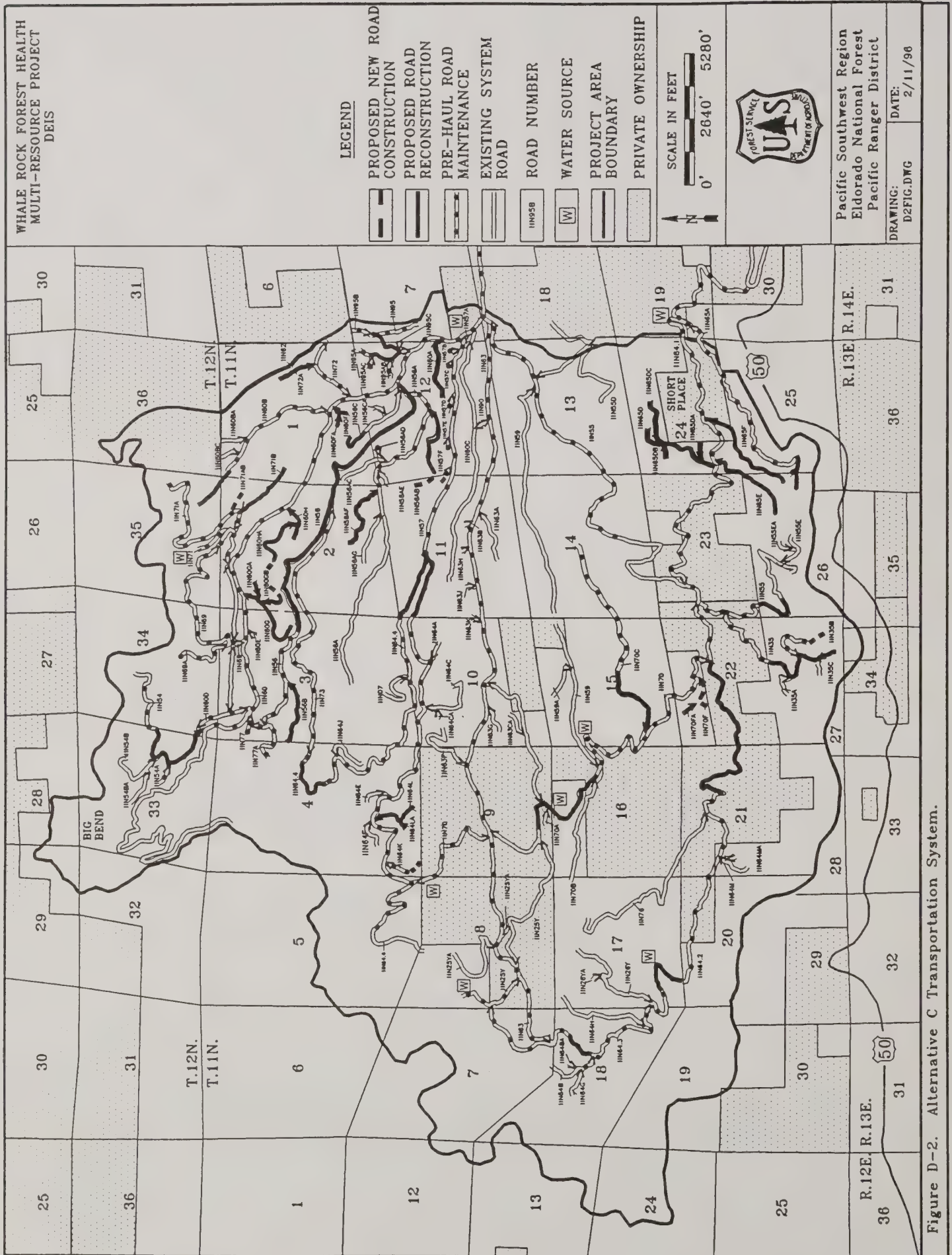


Figure D-2. Alternative C Transportation System.

Alternative: C

## ROAD INFORMATION AND RECOMMENDATIONS

Section A

Sheet 1 of 3

Timber Sale: WHALE ROCK MULTI PRODUCT District: PACIFIC Volume: 13.0 MMBF sawtimber  
31.9 M tons biomass Date: 2-96

ROAD NUMBER	ROAD NAME	ROAD STD. SPEED	WIDTH	M I L E S				R/W NEEDS	COOP STATUS	SALE	MAINT POST	LEVEL	FUNCTIONAL CLASS	SERVICE LEVEL	COSTS	
				NEW CONST.	RECONST.	MAINT.									CONST	--- RECONST
11N35	Vleck Creek	S-5	SL-14		0.65	0.55				4	2		Local	D		\$ 30,000
11N35B	Van Hausen	S-5	SL-14	0.18		0.26				4	1		Local	D	\$ 4,500	
11N35C	Vleck South	S-5	SL-14		0.15					4	1		Local	D		\$ 1,145
11N54	Bend	S-5	SL-12		0.75	0.77				4	2		Local	D		\$ 30,000
11N54A	Bend Spur	S-5	SL-12			0.15				4	2		Local	D		
11N55.1	Peavine Ridge	S-10	D-20			1.80				4	4		Collector	C		
11N55.2	Peavine Ridge	S-10	SL-14			0.65				4	2		Collector	D		
11N55.3	Peavine Ridge	S-5	SL-14		0.35					4	2		Local	D		\$ 18,250
11N55.4	Peavine Ridge	S-5	SL-14			1.00				4	2		Local	D		
11N55B	Chicken Hawk Sprg	S-5	SL-14			0.20				4	2		Local	D		
11N55C	Chicken Trough	S-5	SL-14			0.10				4	1		Local	D		
11N56	Jaybird Canyon	S-5	SL-14		2.36	0.57				4	2		Local	D		\$ 98,400
11N56A	Side Canyon	S-5	SL-14			1.05				4	1		Local	D		
11N56AB	Side Cyn B	S-5	SL-14		0.57					4	1		Local	D		\$ 5,700
11N56AD	Side Cyn D	S-5	SL-14			0.05				4	1		Local	D		
11N56AF	Side Cyn F	S-5	SL-14		0.57					4	1		Local	D		\$ 4,275
11N56B	Bowl Spur	S-5	SL-14		0.41					4	1		Local	D		\$ 20,400
11N56C	Jbird	S-5	SL-14		0.25	0.48				4	1		Local	D		\$ 1,875
11N56CA	Jbird CA	S-5	SL-14			0.12				4	1		Local	D		
11N57	Roundtent Canyon	S-15	SL-14			1.80				4	4		Local	D		
11N57A	Roundtent Waterholes-5	S-14	SL-14			0.10				4	1		Local	D		
11N57B	Roundtent One	S-5	SL-14			0.06				4	1		Local	D		
11N57C	Roundtent Two	S-5	SL-14			0.04				4	1		Local	D		
11N57D	Roundtent Three	S-5	SL-14			0.20				4	1		Local	D		
11N57E	Roundtent Four	S-5	SL-14			0.03				4	1		Local	D		
11N57F	Roundtent Five	S-5	SL-14	0.08		0.06				4	1		Local	D	\$ 800	
11N60.1	Jaybird Spring	S-15	SN-16			5.30			Supp#32 SPI	4	4		Collector	C		
11N60A	Cedar Spring	S-5	SL-14		0.51					4	1		Local	D	\$ 3,800	
11N60B	Jaybird North	S-5	SL-14		0.30	1.04				4	1		Local	D	\$ 2,560	
11N60C	Tent Canyon	S-5	SL-14			2.05				4	1		Local	D		
11N60D	Jolt	S-5	SL-14			0.40				4	1		Local	D		
11N60E	Jade East	S-5	SL-14			0.08				4	1		Local	D		
11N60F	Upper Jaybird	S-5	SL-14		0.12					4	1		Local	D	\$ 1,820	
11N60FA	Upper Jaybird W	S-5	SL-14		0.11					4	1		Local	D	\$ 1,100	
11N60G	Jay Gee	S-5	SL-14		0.64					4	1		Local	D	\$ 4,800	
11N60GA	Jay Gee A	S-5	SL-14		0.15					4	1		Local	D	\$ 1,125	

Sheet 2 of 3

11N60GB	Jay Gee B	S-5	SL-14	0.11	0.23		4	1	Local	D	\$	2,750	\$	1,725
11N60H	Jaybird H	S-5	SL-14		0.28		4	1	Local	D			\$	2,800
11N60HA	Jaybird HA	S-5	SL-14	0.09	0.51		4	1	Local	D	\$	2,250	\$	5,100
11N63	West Peavine Ridge	S-10	SL-14			5.92	Supp#19 SPI 4	3	Collector	C				
11N63A	South Soldier	S-5	SL-14			0.45	4	1	Local	D				
11N63B	Peavine One	S-5	SL-14			0.03	4	1	Local	D				
11N63C	North Allen	S-5	SL-12			1.61	4	1	Local	D				
11N64.1	Spring Valley	S-10	SL-14		1.50	0.90	Supp#19 SPI 4	3	Local	D			\$	60,000
11N64.2	Spring Valley	S-10	SL-14		0.60	1.75	4	3	Local	D			\$	24,000
11N64.3	Spring Valley	S-10	SL-14			0.90	4	2	Local	D				
11N64.4	Spring Valley	S-10	SL-14	1.82		2.30	4	2	Local	D			\$	72,400
11N64B	Peavine End	S-5	SL-14			0.59	4	1	Local	D				
11N64BA	Pea Spur	S-5	SL-14			0.04	4	1	Local	D				
11N64K	Tent Stake	S-5	SL-14	0.16		0.21	4	1	Local	D	\$	4,000		
11N64L	Round Steak	S-5	SL-14		0.40		4	1	Local	D			\$	3,050
11N64LA	Round Steak 2	S-5	SL-14		0.06		4	1	Local	D			\$	500
11N64M	Grays Canyon	S-5	SL-14		0.27		4	1	Local	D			\$	2,050
11N64MA	Grays Spur	S-5	SL-14		0.08		4	1	Local	D			\$	450
11N65	White Meadows	S-15	SL-14			4.30	Supp#19 SPI 4	4	Collector	C				
11N65A	Pony Trail	S-5	SL-14	0.24		1.76	Supp#46 SPI 4	1	Local	D			\$	2,400
11N65D	Shorts North	S-5	SL-14	0.70			4	1	Local	D			\$	29,750
11N65DA	Shorts A	S-5	SL-14	0.15			4	1	Local	D			\$	1,125
11N65DB	Shorts B	S-5	SL-14	0.11			4	1	Local	D			\$	850
11N65DC	Shorts C	S-5	SL-14	0.38			4	1	Local	D			\$	1,900
11N65E	Brockliss	S-5	SL-14	0.31			4	1	Local	D			\$	2,325
11N65F	White Pony	S-5	SL-14	0.87			4	1	Local	D			\$	6,525
11N69	Powerline Rim	S-5	SL-14		1.65		4	2	Local	D				
11N69A	Powerline Rim Spur	S-5	SL-14		0.56		4	2	Local	D				
11N70	McHanus	S-5	SL-14	0.95		3.38	Supp#19 SPI 4	2	Local	D			\$	38,000
11N70B	Tie Spur	S-5	SL-12		0.96		4	1	Local	D				
11N70C	Telephone East	S-5	SL-14		0.40	1.43	4	2	Local	D			\$	18,700
11N70F	North Vleck	S-5	SL-14	0.25			4	1	Local	D	\$	6,250		
11N70FA	North Vleck Spur	S-5	SL-14		0.11		4	1	Local	D			\$	825
11N71	Jaybird Cyn Spring	S-5	SL-14			0.67	4	1	Local	D				
11N71A	Silver Cyn Vista	S-5	SL-14		1.50		4	2	Local	D				
11N71AB	Silver Bullet	S-5	SL-14	0.16			4	2	Local	D				
11N71B	Silver Canyon East	S-5	SL-14				4	1	Local	D	\$	3,300	\$	3,675
11N72	Jaybird Hook	S-5	SL-14	0.49		0.21	4	1	Local	D				
11N72A	Backhaul Spur	S-5	SL-14		0.28		4	2	Local	D				
11N73	Jaybird South	S-5	SL-14			2.41	4	2	Local	D			\$	11,200
11N77	Jaybird Spring W.	S-5	SL-14			0.12	4	2	Local	D				
11N77A	Jaybird Spring S.	S-5	SL-14			0.55	4	2	Local	D				





Section B  
Sheet 1 of 3

Date: 1-95

ROAD INFORMATION AND RECOMMENDATIONS

Alternative: C

Timber Sale: WHALE ROCK MULTI PRODUCT

District: PACIFIC

ROAD NUMBER	SURFACE STABILIZATION	HIGHWAY SAFETY ACT	DESIGN VEHICLE	ROAD CLOSURE METHOD	OHV DESIGNATION	REMARKS
11N35	Spot Rock	N/A	Chip Van		4W, MC, ATV	
11N35B		N/A	Chip Van			
11N35C		N/A	Chip Van			
11N54	Spot Rock	N/A	Chip Van		4W, MC, ATV	
11N55.1	Chip Seal	Applies	Chip Van			
11N55.2		N/A	Chip Van			
11N55.3	Spot Rock	N/A	Chip Van			
11N55.4		N/A	Chip Van			
11N55B		N/A	Chip Van		4W, MC, ATV	
11N55C		N/A	Water Truck			
11N56	Spot Rock	N/A	Chip Van		4W, MC, ATV	
11N56A		N/A	Chip Van		MC, ATV	
11N56AB		N/A	Chip Van			
11N56AD		N/A	Chip Van			
11N56AF		N/A	Chip Van			
11N56B	Spot Rock	N/A	Chip Van		MC, ATV	
11N56C		N/A	Chip Van			
11N56CA		N/A	Chip Van			
11N57	Chip Seal	Applies	Chip Van			
11N57A		N/A	Chip Van			
11N57B		N/A	Chip Van			
11N57C		N/A	Chip Van			
11N57D		N/A	Chip Van			
11N57E		N/A	Chip Van			
11N57F		N/A	Chip Van			
11N60.1	Chip Seal	Applies	Chip Van			Existing coop with SPI (MC), supplement #32.
11N60A		N/A	Chip Van		MC, ATV	
11N60B		N/A	Chip Van		MC, ATV	
11N60C		N/A	Chip Van			
11N60D		N/A	Chip Van			
11N60E		N/A	Chip Van			
11N60F		N/A	Chip Van			
11N60FA		N/A	Chip Van			
11N60G		N/A	Chip Van			
11N60GA		N/A	Chip Van			

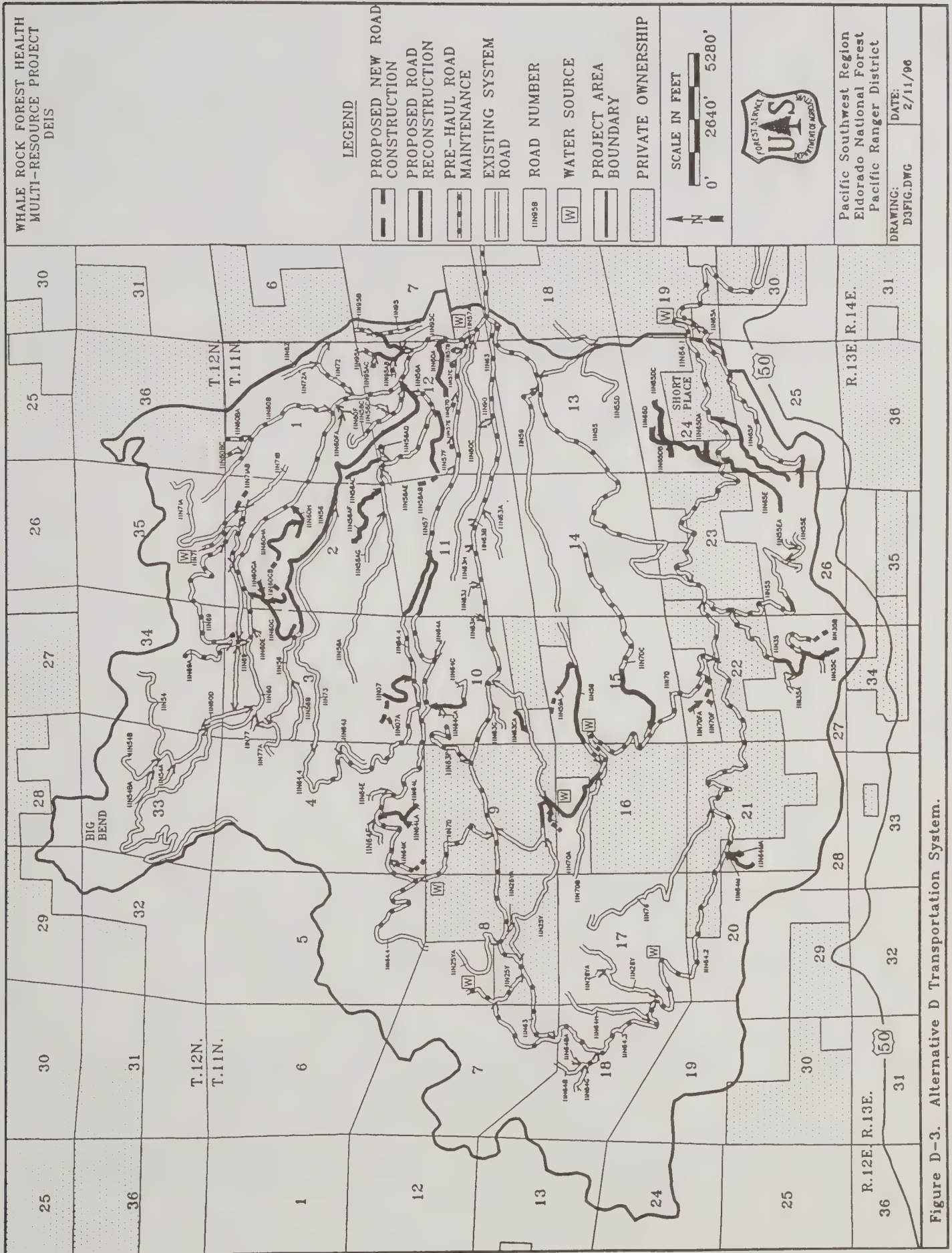
Sheet 2 of 3

11N60GB	N/A	Chip Van			
11N60H	N/A	Chip Van			
11N60HA	N/A	Chip Van			
11N63	Chip Seal, Native Applies	Chip Van			Existing coop with SPI (MC), supplement #19.
11N63A	N/A	Chip Van			
11N63B	N/A	Chip Van			
11N63C	N/A	Chip Van			MC, ATV
11N64.1	Spot Rock	Chip Van			
11N64.2	Spot Rock	Chip Van			
11N64.3		Chip Van			
11N64.4	Spot Rock	Chip Van			4W, MC, ATV
11N64B	N/A	Chip Van			MC, ATV
11N64BA	N/A	Chip Van			
11N64K	N/A	Chip Van			
11N64L	N/A	Chip Van			
11N64LA	N/A	Chip Van			
11N64M	N/A	Chip Van			
11N64MA	N/A	Chip Van			
11N65	Chip Seal	Chip Van			
11N65A	N/A	Chip Van	Gate		
11N65D	Spot Rock	Chip Van	Gate		4W, MC, ATV
11N65DA		Chip Van			
11N65DB		Chip Van			
11N65DC		Chip Van			
11N65E		Chip Van	Gate		
11N65F		Chip Van			
11N69		Chip Van			
11N69A		Chip Van	Gate?		4W, MC, ATV
11N70	Spot Rock	Chip Van			4W, MC, ATV
11N70B		Chip Van			4W, MC, ATV
11N70C	Spot Rock	Chip Van	Gate?		4W, MC, ATV
11N70F		Chip Van			MC, ATV
11N70FA		Chip Van			4W, MC, ATV
11N71		Chip Van	Gate?		4W, MC, ATV
11N71A		Chip Van			4W, MC, ATV
11N71AB		Chip Van			
11N71B		Chip Van			MC, ATV
11N72		Chip Van			4W, MC, ATV
11N72A	Spot Rock	Chip Van			4W, MC, ATV
11N73		Chip Van			4W, MC, ATV
11N77		Chip Van			
11N77A		Chip Van			4W, MC, ATV



Sheet 3 of 3

11N90	N/A	Chip Van
11N95	N/A	Chip Van
11N95A	N/A	Chip Van
11N95AB	N/A	Chip Van
11N95AC	N/A	Chip Van
11N95B	N/A	Chip Van
11N95C	N/A	Chip Van
11N26Y	N/A	Chip Van
11N26YA	N/A	Chip Van
17N12YA	N/A	Water Truck



Alternative: D

## ROAD INFORMATION AND RECOMMENDATIONS

Section A  
Sheet 1 of 2

Timber Sale: WHALE ROCK MULTI PRODUCT District: PACIFIC Volume: 6.4 MMBF sawtimber  
17.2 M tons biomass Date: 2-96

ROAD NUMBER	ROAD NAME	ROAD STD. SPEED WIDTH	M I L E S			R/W NEEDS	COOP STATUS	MAINT LEVEL		FUNCTIONAL CLASS	SERVICE LEVEL	COSTS	
			NEW CONST.	RECONST.	MAINT.			SALE	POST SALE			CONST	RECONST
11W07	Pup Tent	S-5 SL-14	0.42	0.45				4	2	Local	D	\$ 14,700	\$ 2,500
11W07A	Pup Tent East	S-5 SL-14	0.06					4	1	Local	D	\$ 900	
11N35	Vleck Creek	S-5 SL-14		0.65	0.55			4	2	Local	D	\$ 26,000	
11N35B	Van Hausen	S-5 SL-14	0.18		0.26			4	1	Local	D	\$ 4,500	
11N35C	Vleck South	S-5 SL-14		0.10				4	1	Local	D		\$ 1,145
11W55.1	Peavine Ridge	S-10 D-20			1.80			4	4	Collector	C		
11W55.2	Peavine Ridge	S-10 SL-14			0.65			4	2	Collector	D		
11W55.3	Peavine Ridge	S-5 SL-14		0.25				4	2	Local	D	\$ 900	
11W55.4	Peavine Ridge	S-5 SL-14			0.85			4	2	Local	D		
11W55B	Chicken Hawk Sprg	S-5 SL-14			0.20			4	2	Local	D		
11W55C	Chicken Trough	S-5 SL-14			0.10			4	1	Local	D		
11W56	Jaybird Canyon	S-5 SL-14		2.36	0.57			4	2	Local	D	\$ 98,400	
11W56A	Side Canyon	S-5 SL-14			0.75			4	1	Local	D		
11W56AC	Side Cyn C	S-5 SL-14		0.36				4	1	Local	D	\$ 3,100	
11W56AD	Side Cyn D	S-5 SL-14			0.05			4	1	Local	D		
11W56AF	Side Cyn F	S-5 SL-14		0.52				4	1	Local	D	\$ 4,275	
11W56B	Bowl Spur	S-5 SL-14			0.51			4	1	Local	D		
11W56C	Jbird	S-5 SL-14			0.48			4	1	Local	D		
11W56CA	Jbird CA	S-5 SL-14			0.12			4	1	Local	D		
11W57	Roundtent Canyon	S-15 SL-14			1.55			4	4	Local	D		
11W57A	Roundtent Waterholes	S-15 SL-14			0.10			4	1	Local	D		
11W57B	Roundtent One	S-5 SL-14			0.06			4	1	Local	D		
11W57C	Roundtent Two	S-5 SL-14			0.04			4	1	Local	D		
11W57D	Roundtent Three	S-5 SL-14			0.20			4	1	Local	D		
11W57E	Roundtent Four	S-5 SL-14			0.03			4	1	Local	D		
11W59	Soldier Creek	S-5 SL-14			1.50		Supp#19 SPI	4	2	Local	D		
11W59A	Robb North	S-5 SL-14		0.11				4	1	Local	D	\$ 1,600	
11W60.1	Jaybird Spring	S-15 SN-16			4.60		Supp#32 SPI	4	4	Collector	C		
11W60A	Cedar Spring	S-5 SL-14		0.46				4	1	Local	D	\$ 3,800	
11W60C	Tent Canyon	S-5 SL-14			1.75			4	1	Local	D		
11W60D	Jolt	S-5 SL-14			0.40			4	1	Local	D		
11W60G	Jay Gee	S-5 SL-14		0.59				4	1	Local	D	\$ 4,800	
11W60GA	Jay Gee A	S-5 SL-14		0.10				4	1	Local	D	\$ 1,125	
11W60GB	Jay Gee B	S-5 SL-14	0.11	0.18				4	1	Local	D	\$ 2,750	\$ 1,725
11W60H	Jaybird H	S-5 SL-14		0.23				4	1	Local	D	\$ 2,800	
11W60HA	Jaybird HA	S-5 SL-14	0.09	0.46				4	1	Local	D	\$ 2,250	\$ 5,100
11N63	West Peavine Ridge	S-10 SL-14			3.75		Supp#19 SPI	4	3	Collector	C		





Section B  
Sheet 1 of 2

Date: 2-96

ROAD INFORMATION AND RECOMMENDATIONS

Alternative: D

Timber Sale: WHALE ROCK MULTI PRODUCT				District: PACIFIC			
ROAD NUMBER	SURFACE STABILIZATION	HIGHWAY SAFETY ACT	DESIGN VEHICLE	ROAD CLOSURE METHOD	OHV DESIGNATION	REMARKS	
11N07		N/A	Chip Van				
11N07A		N/A	Chip Van				
11N35	Spot Rock	N/A	Chip Van		4W, MC, ATV		
11N35B		N/A	Chip Van				
11N35C		N/A	Chip Van				
11N55.1	Chip Seal	Applies	Chip Van				
11N55.2		N/A	Chip Van				
11N55.3		N/A	Chip Van				
11N55.4		N/A	Chip Van				
11N55B		N/A	Chip Van		4W, MC, ATV		
11N55C		N/A	Water Truck				
11N56	Spot Rock	N/A	Chip Van		4W, MC, ATV		
11N56A		N/A	Chip Van		MC, ATV		
11N56AC		N/A	Chip Van				
11N56AD		N/A	Chip Van				
11N56AF		N/A	Chip Van				
11N56B		N/A	Chip Van		MC, ATV		
11N56C		N/A	Chip Van				
11N56CA		N/A	Chip Van				
11N57	Chip Seal	Applies	Chip Van				
11N57A		N/A	Chip Van				
11N57B		N/A	Chip Van				
11N57C		N/A	Chip Van				
11N57D		N/A	Chip Van				
11N57E		N/A	Chip Van				
11N59		N/A	Chip Van				
11N59A		N/A	Chip Van				
11N60.1	Chip Seal	Applies	Chip Van				
11N60A		N/A	Chip Van				
11N60C		N/A	Chip Van		MC, ATV		
11N60D		N/A	Chip Van				
11N60G		N/A	Chip Van				
11N60GA		N/A	Chip Van				
11N60GB		N/A	Chip Van				
11N60H		N/A	Chip Van				
11N60HA		N/A	Chip Van				
11N63	Chip Seal, Native	Applies	Chip Van				

Existing coop with SPI (MC), supplement #32.

Existing coop with SPI (MC), supplement #19.

Sheet 2 of 2

11N63A	N/A	Chip Van	MC,ATV	Existing coop with SPI (MC), supplement #19.
11N63B	N/A	Chip Van		
11N63C	N/A	Chip Van		
11N63CA	N/A	Chip Van		
11N64.1	N/A	Chip Van		
11N64.2	N/A	Chip Van		
11N64.3	N/A	Chip Van		
11N64.4	N/A	Chip Van		
11N64B	N/A	Chip Van	MC,ATV	
11N64BA	N/A	Chip Van		
11N64C	N/A	Chip Van		
11N64K	N/A	Chip Van		
11N64L	N/A	Chip Van		
11N64LA	N/A	Chip Van		
11N64M	N/A	Chip Van		
11N64MA	N/A	Chip Van		
11N65	Applies	Chip Van		Existing coop with SPI (MC), supplement #19.
11N65A	N/A	Chip Van		
11N65D	N/A	Chip Van	4W,MC,ATV	
11N65DA	N/A	Chip Van		
11N65DB	N/A	Chip Van		
11N65DC	N/A	Chip Van		
11N65E	N/A	Chip Van		
11N65F	N/A	Chip Van		
11N69	N/A	Chip Van		
11N69A	N/A	Chip Van	4W,MC,ATV	
11N70	N/A	Chip Van	4W,MC,ATV	
11N70A	N/A	Chip Van	4W,MC,ATV	
11N70B	N/A	Chip Van		
11N70C	N/A	Chip Van		
11N70F	N/A	Chip Van		
11N70FA	N/A	Chip Van		
11N71	N/A	Chip Van		
11N71A	N/A	Chip Van	4W,MC,ATV	
11N71AB	N/A	Chip Van	4W,MC,ATV	
11N72	N/A	Chip Van	4W,MC,ATV	
11N90	N/A	Chip Van		
11N95	N/A	Chip Van		
11N95A	N/A	Chip Van		
11N95AB	N/A	Chip Van		
11N95AC	N/A	Chip Van		
11N95C	N/A	Chip Van		
11N26Y	N/A	Chip Van		
11N26YA	N/A	Chip Van	MC,ATV	
17N12YA	N/A	Water Truck		



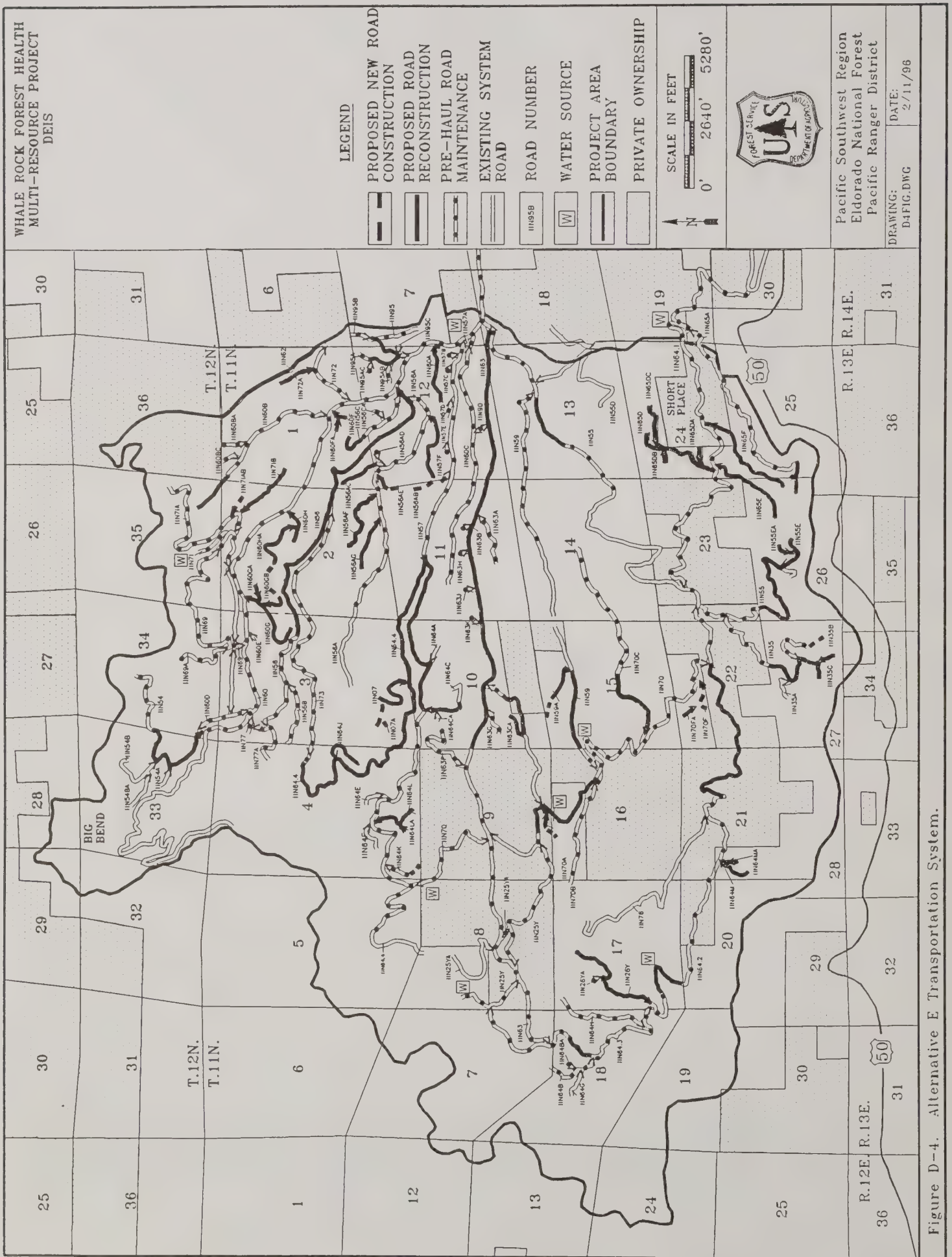


Figure D-4. Alternative E Transportation System.

Alternative: E

## ROAD INFORMATION AND RECOMMENDATIONS

Section A  
Sheet 1 of 3

Timber Sale: WHALE ROCK MULTI PRODUCT				District: PACIFIC				Volume: 19.5 MMBF sawtimber-Alt.G&H 49.6 M tons biomass-Alt.G 80.7 M tons biomass-Alt.H				Date: 2-96			
ROAD NUMBER	ROAD NAME	ROAD STD. SPEED WIDTH	M I L E S				COSTS								
			NEW CONST.	RECONST.	MAINT.	R/W NEEDS	COOP STATUS	MAINT LEVEL	FUNCTIONAL CLASS	SERVICE LEVEL	CONST	--- RECONST			
11N07	Pup Tent	S-5 SL-14	0.42	0.54				4	2	Local	D	\$ 14,700	\$ 2,500		
11N07A	Pup Tent East	S-5 SL-14	0.06					4	1	Local	D	\$ 900			
11N35	Vleck Creek	S-5 SL-14		0.55	0.65			4	2	Local	D		\$ 22,000		
11N35B	Van Hausen	S-5 SL-14	0.18		0.26			4	1	Local	D	\$ 4,500			
11N35C	Vleck South	S-5 SL-14		0.19				4	1	Local	D		\$ 7,145		
11N54	Bend	S-5 SL-14		0.75	0.77			4	2	Local	D		\$ 30,000		
11N55.1	Peavine Ridge	S-10 D-20			1.50			4	4	Collector	C				
11N55.2	Peavine Ridge	S-10 SL-14			0.65			4	2	Collector	D				
11N55.3	Peavine Ridge	S-5 SL-14		0.95				4	2	Local	D		\$ 40,250		
11N55.4	Peavine Ridge	S-5 SL-14			1.00			4	2	Local	D				
11N55B	Chicken Hawk Sprg	S-5 SL-14			0.20			4	2	Local	D				
11N55C	Chicken Trough	S-5 SL-14			0.10			4	1	Local	D				
11N55E	Brock	S-5 SL-14		0.34				4	1	Local	D		\$ 9,750		
11N55EA	Brock Spur	S-5 SL-14		0.18				4	1	Local	D		\$ 1,435		
11N56	Jaybird Canyon	S-5 SL-14		2.36	0.57			4	2	Local	D		\$ 98,400		
11N56A	Side Canyon	S-5 SL-14			2.75			4	1	Local	D				
11N56AB	Side Cyn B	S-5 SL-14	0.19	0.61				4	1	Local	D	\$ 4,750	\$ 5,700		
11N56AC	Side Cyn C	S-5 SL-14		0.45				4	1	Local	D		\$ 3,100		
11N56AD	Side Cyn D	S-5 SL-14			0.05			4	1	Local	D				
11N56AE	Side Cyn E	S-5 SL-14	0.13	0.20				4	1	Local	D	\$ 3,150	\$ 1,200		
11N56AF	Side Cyn F	S-5 SL-14		0.61				4	1	Local	D		\$ 4,275		
11N56AG	Side Cyn G	S-5 SL-14		0.46				4	1	Local	D		\$ 4,200		
11N56B	Bowl Spur	S-5 SL-14		0.51				4	1	Local	D		20,400		
11N56C	Jbird	S-5 SL-14		0.29				4	1	Local	D		\$ 1,875		
11N56CA	Jbird CA	S-5 SL-14			0.12			4	1	Local	D				
11N57	Roundtent Canyon	S-15 SL-14			1.60			4	4	Local	D				
11N57A	Roundtent Waterholes	S-5 SL-14			0.10			4	1	Local	D				
11N57B	Roundtent One	S-5 SL-14			0.06			4	1	Local	D				
11N57C	Roundtent Two	S-5 SL-14			0.04			4	1	Local	D				
11N57D	Roundtent Three	S-5 SL-14			0.20			4	1	Local	D				
11N57E	Roundtent Four	S-5 SL-14			0.03			4	1	Local	D				
11N57F	Roundtent Five	S-5 SL-14	0.08		0.06			4	1	Local	D				
11N59	Soldier Creek	S-5 SL-14			1.58			Supp#19 SPI	4	Local	D	\$ 800			
11N59A	Robb North	S-5 SL-14	0.23	0.37				4	1	Local	D	\$ 5,750	\$ 7,300		
11N60.1	Jaybird Spring	S-15 SN-16			4.30			Supp#32 SPI	4	Collector	C				

Sheet 2 of 3

11N60A	Cedar Spring	S-5	SL-14	0.50		4	1	Local	D	\$ 3,800
11N60B	Jaybird North	S-5	SL-14	0.38	1.04	4	1	Local	D	\$ 2,560
11N60C	Tent Canyon	S-5	SL-14		1.75	4	1	Local	D	
11N60D	Jolt	S-5	SL-14		0.40	4	1	Local	D	
11N60E	Jade East	S-5	SL-14		0.08	4	1	Local	D	
11N60F	Upper Jaybird	S-5	SL-14	0.16		4	1	Local	D	\$ 1,820
11N60FA	Upper Jaybird W	S-5	SL-14	0.15		4	1	Local	D	\$ 1,100
11N60G	Jay Gee	S-5	SL-14	0.67		4	1	Local	D	\$ 4,800
11N60GA	Jay Gee A	S-5	SL-14	0.15		4	1	Local	D	\$ 1,125
11N60GB	Jay Gee B	S-5	SL-14	0.27		4	1	Local	D	\$ 1,725
11N60GC	Jay Gee C	S-5	SL-14	0.13		4	1	Local	D	\$ 650
11N60H	Jaybird H	S-5	SL-14	0.32		4	1	Local	D	\$ 2,800
11N60HA	Jaybird HA	S-5	SL-14	0.55		4	1	Local	D	\$ 5,100
11N63	West Peavine Ridge	S-10	SL-14	3.21	1.11	Supp#19 SP1 4	3	Collector	C	\$136,400
11N63A	South Soldier	S-5	SL-14		0.45	4	1	Local	D	
11N63B	Peavine One	S-5	SL-14		0.03	4	1	Local	D	
11N63C	North Allen	S-5	SL-12		1.31	Supp#19 SP1 4	1	Local	D	
11N63CA	North Allen Spur	S-5	SL-14	0.22		4	1	Local	D	\$ 2,000
11N63F	Silver Pea	S-5	SL-14		0.65	Supp#51 SP1 4	2	Local	D	
11N63G	North Soldier	S-5	SL-14		0.24	4	1	Local	D	
11N63H	Peavine Two	S-5	SL-14		0.03	4	1	Local	D	
11N63J	Peavine Three	S-5	SL-14		0.09	4	1	Local	D	
11N63K	Peavine Four	S-5	SL-14		0.05	4	1	Local	D	
11N64.1	Spring Valley	S-10	SL-14	1.50	0.90	Supp#19 SP1 4	3	Local	D	\$ 60,000
11N64.2	Spring Valley	S-10	SL-14	0.60	1.75	4	3	Local	D	\$ 24,000
11N64.3	Spring Valley	S-10	SL-14		0.90	4	2	Local	D	
11N64.4	Spring Valley	S-10	SL-14	4.13	0.31	4	2	Local	D	\$169,600
11N64B	Peavine End	S-5	SL-14		0.59	4	1	Local	D	
11N64BA	Pea Spur	S-5	SL-14		0.04	4	1	Local	D	
11N64C	Silver Tip	S-5	SL-14	0.56		4	1	Local	D	\$ 22,400
11N64CA	Silver Tip Top	S-5	SL-14		0.07	4	1	Local	D	
11N64H	Tie Rod	S-5	SL-14		0.84	4	1	Local	D	
11N64J	Round Tuft	S-5	SL-14	0.26	0.15	4	1	Local	D	\$ 2,200
11N64K	Tent Stake	S-5	SL-14		0.21	4	1	Local	D	\$ 4,000
11N64L	Round Steak	S-5	SL-14	0.44		4	1	Local	D	\$ 3,050
11N64LA	Round Steak 2	S-5	SL-14	0.10		4	1	Local	D	\$ 500
11N65	White Meadows	S-15	SL-14		3.30	Supp#19 SP1 4	4	Collector	C	
11N65A	Pony Trail	S-5	SL-14	0.28	1.56	Supp#46 SP1 4	1	Local	D	\$ 2,400
11N65D	Shorts North	S-5	SL-14	0.74		4	1	Local	D	\$ 29,750



Sheet 3 of 3

11N65DA	Shorts A	S-5	SL-14	0.19		4	1	Local	D	\$ 1,125
11N65DB	Shorts B	S-5	SL-14	0.15		4	1	Local	D	\$ 850
11N65DC	Shorts C	S-5	SL-14	0.42		4	1	Local	D	\$ 1,900
11N65E	Brookliss	S-5	SL-14	0.72		4	1	Local	D	\$ 5,100
11N65F	White Pony	S-5	SL-14	0.91		4	1	Local	D	\$ 6,525
11N69	Powerline Rim	S-5	SL-14		1.45	4	2	Local	D	
11N69A	Powerline Rim Spur	S-5	SL-14		0.56	4	2	Local	D	
11N70	McManus	S-5	SL-14	0.95	3.38	4	2	Local	D	\$ 38,000
11N70A	McManus Spur	S-5	SL-14			Supp#19 SPI 4	2	Local	D	\$ 3,500
11N70B	Tie Spur	S-5	SL-14	0.14		4	1	Local	D	\$ 800
11N70C	Telephone East	S-5	SL-12	0.75		4	1	Local	D	\$ 30,000
11N70F	North Vleck	S-5	SL-14	0.40	1.43	4	2	Local	D	\$ 18,700
11N70FA	North Vleck Spur	S-5	SL-14			4	1	Local	D	\$ 6,250
11N71	Jaybird Cyn Spring	S-5	SL-14	0.15		4	1	Local	D	\$ 825
11N71A	Silver Cyn Vista	S-5	SL-14	0.67		4	2	Local	D	
11N71AB	Silver Bullet	S-5	SL-14	0.20	1.30	4	2	Local	D	\$ 8,000
11N71B	Silver Canyon East	S-5	SL-14			4	1	Local	D	\$ 3,300
11N72	Jaybird Hook	S-5	SL-14	0.53		4	1	Local	D	\$ 19,600
11N72A	Backhaul Spur	S-5	SL-14	0.28	0.59	4	2	Local	D	\$ 11,200
11N73	Jaybird South	S-5	SL-14			4	2	Local	D	
11N77	Jaybird Spring W	S-5	SL-14	2.17		4	2	Local	D	
11N77A	Jaybird Spring S	S-5	SL-14	0.12		4	2	Local	D	
11N90	Pea Tent Tie	S-5	SL-14	0.55		4	2	Local	D	
11N95	North Cedar	S-5	SL-14	0.16		4	1	Local	D	
11N95A	North Cedar One	S-5	SL-14	0.34		4	1	Local	D	\$ 750
11N95AB	North Cedar Two	S-5	SL-14	0.32		4	1	Local	D	\$ 2,100
11N95AC	North Cedar Three	S-5	SL-14	0.13		4	1	Local	D	
11N95C	North Cedar Five	S-5	SL-14	0.09		4	1	Local	D	
11N25YA	Rice Ridge	S-5	SL-14	0.05		4	1	Local	D	
11N26Y	Tin Soldier	S-5	SL-14	0.76		Supp#46 SPI 4	2	Local	D	
17N12YA	Mich-Cal WaterHole	S-5	SL-12	0.91		4	1	Local	D	\$ 36,400
					0.10	SPI 4	2	Local	D	
TOTALS =				2.20	32.10	48.52				\$ 56,600 \$ 919,185
										<u>TOTAL = \$ 975,785</u>

Section B  
Sheet 1 of 3

Date: 2-96

ROAD INFORMATION AND RECOMMENDATIONS

Alternative: E

Timber Sale: WHALE ROCK MULTI PRODUCT

District: PACIFIC

ROAD NUMBER	SURFACE STABILIZATION	HIGHWAY SAFETY ACT	DESIGN VEHICLE	ROAD CLOSURE METHOD	OHV DESIGNATION	REMARKS
11N07		N/A	Chip Van			
11N07A		N/A	Chip Van			
11N35	Spot Rock	N/A	Chip Van		4W, MC, ATV	
11N35B		N/A	Chip Van			
11N35C		N/A	Chip Van			
11N54	Spot Rock	N/A	Chip Van		4W, MC, ATV	
11N55.1	Chip Seal	Applies	Chip Van			
11N55.2		N/A	Chip Van			
11N55.3	Spot Rock	N/A	Chip Van			
11N55.4		N/A	Chip Van			
11N55B		N/A	Chip Van		4W, MC, ATV	
11N55C		N/A	Water Truck			
11N55E		N/A	Chip Van			
11N55EA		N/A	Chip Van			
11N56	Spot Rock	N/A	Chip Van		4W, MC, ATV	
11N56A		N/A	Chip Van		MC, ATV	
11N56AB		N/A	Chip Van			
11N56AC		N/A	Chip Van			
11N56AD		N/A	Chip Van			
11N56AE		N/A	Chip Van			
11N56AF		N/A	Chip Van			
11N56AG		N/A	Chip Van			
11N56B	Spot Rock	N/A	Chip Van		MC, ATV	
11N56C		N/A	Chip Van			
11N56CA		N/A	Chip Van			
11N57	Chip Seal	Applies	Chip Van			
11N57A		N/A	Chip Van			
11N57B		N/A	Chip Van			
11N57C		N/A	Chip Van			
11N57D		N/A	Chip Van			
11N57E		N/A	Chip Van			
11N57F		N/A	Chip Van			
11N59		N/A	Chip Van			
11N60.1	Chip Seal	Applies	Chip Van			

Existing coop with SPI (MC), supplement #32.

Sheet 2 of 3

11N60A	N/A	Chip Van	MC,ATV	Existing coop with SPI (MC), supplement #19.
11N60B	N/A	Chip Van	MC,ATV	
11N60C	N/A	Chip Van		
11N60D	N/A	Chip Van		
11N60E	N/A	Chip Van		
11N60F	N/A	Chip Van		
11N60FA	N/A	Chip Van		
11N60G	N/A	Chip Van		
11N60GA	N/A	Chip Van		
11N60GB	N/A	Chip Van		
11N60GC	N/A	Chip Van		Existing coop with SPI (MC), supplement #19.
11N60H	N/A	Chip Van		
11N60HA	N/A	Chip Van		
11N63	Chip Seal, Native Applies	Chip Van		
11N63A	N/A	Chip Van		
11N63B	N/A	Chip Van		
11N63C	N/A	Chip Van	MC,ATV	
11N63CA	N/A	Chip Van		
11N63F	N/A	Chip Van	4W,MC,ATV	
11N63G	N/A	Chip Van		
11N63H	N/A	Chip Van		Existing coop with SPI (MC), supplement #19.
11N63J	N/A	Chip Van		
11N63K	N/A	Chip Van		
11N64.1	Spot Rock	Chip Van		
11N64.2		Chip Van		
11N64.3		Chip Van		
11N64.4	Spot Rock	Chip Van	4W,MC,ATV	
11N64B		Chip Van	MC,ATV	
11N64BA		Chip Van		
11N64C	Spot Rock	Chip Van	MC,ATV	
11N64CA		Chip Van		Existing coop with SPI (MC), supplement #19.
11N64H		Chip Van	MC,ATV	
11N64J		Chip Van		
11N64K		Chip Van		
11N64L		Chip Van		
11N64LA		Chip Van		
11N65	Chip Seal	Chip Van		
11N65A	Applies	Chip Van		
11N65D	N/A	Chip Van	4W,MC,ATV	
		Gate		
		Gate		



Sheet 3 of 3

11N65DA	N/A	Chip Van			
11N65DB	N/A	Chip Van			
11N65DC	N/A	Chip Van			
11N65E	N/A	Chip Van	Gate		
11N65F	N/A	Chip Van			
11N69	N/A	Chip Van			
11N69A	N/A	Chip Van	Gate?	4W, MC, ATV	
11N70	N/A	Chip Van		4W, MC, ATV	
11N70A	N/A	Chip Van	Gate?	4W, MC, ATV	
11N70B	N/A	Chip Van			
11N70C	N/A	Chip Van			
11N70F	N/A	Chip Van		MC, ATV	
11N70FA	N/A	Chip Van		4W, MC, ATV	
11N71	N/A	Chip Van			
11N71A	N/A	Chip Van	Gate?	4W, MC, ATV	
11N71AB	N/A	Chip Van		4W, MC, ATV	
11N71B	N/A	Chip Van			
11N72	N/A	Chip Van		MC, ATV	
11N72A	N/A	Chip Van		4W, MC, ATV	
11N73	N/A	Chip Van		4W, MC, ATV	
11N77	N/A	Chip Van		4W, MC, ATV	
11N77A	N/A	Chip Van		4W, MC, ATV	
11N90	N/A	Chip Van		4W, MC, ATV	
11N95	N/A	Chip Van		4W, MC, ATV	
11N95A	N/A	Chip Van			
11N95AB	N/A	Chip Van		4W, MC, ATV	
11N95AC	N/A	Chip Van			
11N95C	N/A	Chip Van			
11N25YA	N/A	Chip Van			
11N26Y	N/A	Chip Van			
17N12YA	N/A	Water Truck			

Existing coop with SPI (MC), supplement #19.

## **APPENDIX E**

### **SUPPLEMENTAL INFORMATION FOR SENSITIVE PLANTS FOR THE WHALE ROCK PROJECT AREA**

ELDORADO NATIONAL FOREST

PACIFIC RANGER DISTRICT

*Please use this page for notes.*



**SUPPLEMENTAL BIOLOGICAL EVALUATION**  
**FOR SENSITIVE PLANTS**  
**FOR THE PROPOSED WHALE ROCK**  
**ENVIRONMENTAL IMPACT STATEMENT**

ELDORADO NATIONAL FOREST

PACIFIC RANGER DISTRICT

Prepared By: \s\ Robin Barron Date: \_\_\_\_\_  
ROBIN BARRON  
Pacific District Botanist

Prepared By: Mike Taylor Date: 5 March 96  
MIKE TAYLOR  
Botanist

## I. INTRODUCTION

This biological evaluation (BE) analyzes the potential effects of the proposed Whale Rock Forest Health Improvement Project on the ten sensitive plant species currently listed by the Regional Forester for the Eldorado National Forest. The names and current status of these species are shown in Table 1. The purpose of this BE is to review the proposed project alternatives in sufficient detail to determine if they may result in a trend towards Federal listing for the species listed in Table 1.

No endangered, threatened or proposed species are known or suspected to occur on the Pacific Ranger District.

One species on the Forest, Senecio layneae, has been proposed for listing as threatened under the Endangered Species Act (USDI Fish and Wildlife Service 1994). This species is not known to occur on the Pacific Ranger District due to lack of habitat (see Table 2).

<b>Table 1. Status of the sensitive plants known or suspected to occur on the Eldorado National Forest (USDA Forest Service 1990).</b>							
SPECIES	STATUS OF SENSITIVE PLANT SPECIES						
	F E D E R A L						STATE
	E	T	P	S	C1	C2	R
<i>Calochortus clavatus</i> <i>var. avius</i>				X	X		
<i>Draba asterophora</i> <i>var. asterophora</i>				X			
<i>Draba asterophora</i> <i>var. macrocarpa</i>				X		X	
<i>Lewisia longipetala</i>				X		X	
<i>Lewisia serrata</i>				X		X	
<i>Lomatium stebbinsii</i>				X		X	
<i>Navarretia prolifera</i> <i>ssp. lutea</i>				X			
<i>Phacelia stebbinsii</i>				X		X	
<i>Senecio layneae</i>			X	X			X
<i>Silene invisa</i>				X			

**LEGEND** State & Federal Status: FE = Federal/Endangered; FT = Federal/Threatened; FP = Federal/Proposed; FS = Region 5/Sensitive; C1 = Category 1 Candidate; C2 = Category 2 Candidate; SR = State/Rare.

The proposed Forest Health Improvement Project is located in the Peavine (501) and Jaybird (502) compartments, 20 miles northeast of Placerville. This project is being analyzed as the Whale Rock Forest Health Improvement Project Environmental Impact Statement.

There are two species of concern for this project, Pleasant Valley mariposa lily (Calochortus clavatus var. avius) and yellow bur navarretia (Navarretia prolifera ssp. lutea). Two other sensitive species, Stebbins' phacelia (Phacelia stebbinsii) and

saw-toothed lewisia (*Lewisia serrata*) inhabit the steep, rocky slopes found in the inner gorges of Silver Creek, which forms the northern and western boundaries of this project area. Since no project activities are planned within this habitat, these two species will not be addressed in this biological evaluation.

No other sensitive plant species are known or suspected to occur within the project area. As shown in Table 2, no other potential habitats for sensitive plant species are present in the project area.

<b>Table 2. Habitat Potential of the proposed project area for the sensitive plants known or suspected to occur on the Eldorado National Forest.</b>		
SPECIES	Potential of Habitat for Sensitive Plant Species	
	Potential	Habitat Unsuitable Based on the Following
<i>Calochortus clavatus</i> <i>var. avius</i>	X	
<i>Draba asterophora</i> <i>var. asterophora</i>		The elevation of the proposed project is too low; this taxon is found in alpine habitats at 8,600 to 10,800 feet.
<i>Draba asterophora</i> <i>var. macrocarpa</i>		The elevation of the proposed project is too low; this taxon is found in alpine habitats at 8,400 to 9,300 feet.
<i>Lewisia longipetala</i>		The elevation of the proposed project is too low, this species is found in alpine habitats at 8,400 to 12,250 feet.
<i>Lewisia serrata</i>		The north facing, inner gorge cliff-type habitat preferred by this species will receive no harvest or post-harvest trtmt.
<i>Lomatium stebbinsii</i>		The analysis area is outside of the known and predicted range of this species.
<i>Navarretia prolifera</i> <i>ssp. lutea</i>	X	
<i>Phacelia stebbinsii</i>		This species occurs within the steep inner gorges of Silver Creek. No treatment/activity is planned in this habitat.
<i>Senecio layneae</i>		The gabbro/serpentine soils and chaparral habitats preferred by this foothill woodland species are absent from the area.
<i>Silene invisa</i>		The elevation of the proposed project is too low; this species is found in red fir forests above 6,500 feet.



## II. MANAGEMENT DIRECTION

The phrase *sensitive species* is defined in the Forest Service Manual (FSM 2670.5) as "those plant and animal species identified by a Regional Forester for which population viability is a concern."

Current policy as stated in the Forest Service Manual (FSM 2670.32) includes the following:

1. Avoid or minimize impacts to species whose viability has been identified as a concern.
2. If impacts cannot be avoided, analyze the significance of the potential adverse effects on the population or its habitat within the area of concern and on the species as a whole.

The goal of the Forest Sensitive Plant Program is to maintain viable populations of sensitive plant species, and under Management Practice 49, the General Direction is to "provide for protection and habitat needs of sensitive plants so that Forest activities will not jeopardize the continued existence of such species" (Land and Resource Management Plan 1989).

## III. RANGE, DISTRIBUTION, SUITABLE HABITAT, AND DESIRED FUTURE CONDITION

### A. Calochortus clavatus var. avius

#### Range and Distribution

Calochortus clavatus var. avius is endemic to the Eldorado National Forest and adjoining private lands in the area between Union Valley Reservoir and the North Fork of the Mokelumne River and is currently known to occur at 125 locations within this roughly 420 square-mile area (Forest maps/Sensitive Plant files 1994). Of these 125 occurrences, 12 are located on private lands, 4 are located on both private and Forest Service lands and the remaining 109 occur entirely on public lands.

New occurrences continue to be discovered, primarily by Forest Service field personnel; e.g., 23 new occurrences were discovered during the 1993 field season. Discoveries in recent years have not substantially increased the known range of C. clavatus var. avius.

Historical accounts include a report of C. clavatus var. avius from Mariposa County, but no collections survive and the precise identity of the plants at this location has never been independently confirmed (Farwig 1991). This site (White Rock) has been subsequently altered by the development of the White Rock Mine, and C. clavatus var. avius has yet to be (re-)discovered outside of the range described above.

### Suitable Habitat

The following description of suitable habitat is based on an analysis of the data compiled from the occurrence records for all 125 known occurrences of C. clavatus var. avius (Forest/District maps/Sensitive Plant files 1994).

Suitable habitat for C. clavatus var. avius consists of openings in mixed conifer and ponderosa pine forests, on canyon slopes, spurs, and ridges with southerly aspects, at elevations of 2,800 to 5,600 feet. These edaphically determined openings typically have rocky soils with surface rocks and cobbles readily apparent. No positive correlation with soil has been demonstrated though negative correlation with high timber site is apparent. Common plant associates include ponderosa pine, incense cedar, California black oak, canyon live oak, manzanita and bear clover. The canopy cover provided by these trees and shrubs is usually under fifty percent. The presence of C. clavatus var. avius in open stands of conifers may indicate an intolerance of deep shade. Fire appears to be a key habitat component, as evidence of fire in the form of fire scarred trees and logs is apparent at the majority of occurrences.

The habitat described above is patchy in distribution and occurs in discrete units of 1 to 40 acres separated by gaps of unsuitable habitat that vary in width from 1/8 mile to 4 or more miles. Aggregates of occurrences are found along east-west trending ridges that possess numerous south-facing spurs. Dense stands of ponderosa pine or mixed-conifer forest are usually present on the deeper soils located between islands of suitable C. clavatus var. avius habitat. Disturbances such as fire and wind-throw may provide openings in the forest that are suitable for at least temporary occupancy by C. clavatus var. avius. These temporary openings in areas otherwise unsuitable for the species may provide dispersal corridors by providing opportunities for short-lived colonies of plants to produce viable seed; seed that may then be disseminated to suitable habitats that were otherwise too distant from other long-lived occurrences.

### Desired Future Condition

The following description of desired future condition is based on analysis of vegetation data collected from known occurrences and modified to meet the site-specific characteristics of the Whale Rock Forest Health Improvement Project as determined by field reconnaissance in 1994.

Where the combination of suitable soils, aspect, elevation, and topographic position occur as described under suitable habitat, the desired condition for these types of sites consists of vegetation with the following characteristics: 1) mixed-conifer timber stands with 20-60 trees (with dbh > 8 inches) per acre with an understory consisting of clumps of shrubs or scattered individual shrubs; 2) bear clover, where present, does not form a continuous and impenetrable layer; 3) open patches between trees and shrubs support a thin cover of grasses and forbs, including C. clavatus var. avius; 4) the frequency of understory fires varies from 10-20 years.

**B. Navarretia prolifera ssp. lutea**Range and Distribution

Navarretia prolifera ssp. lutea is a highly localized subspecies that is restricted to a narrow east-west band 18 miles long and 8 miles wide centered over Camino, El Dorado County. All of the known occurrences are found within ten miles of Camino. Within the 144-square-mile area described above there are 80 documented occurrences of this annual forb. About two-thirds of these occurrences are located on public land; the remainder are found on private lands.

Suitable Habitat

All of the occurrences of N. prolifera ssp. lutea occur in openings in or adjacent to mixed conifer forests dominated by ponderosa pine, incense cedar, sugar pine, and California black oak. Shrub dominants and some herbaceous associates typically include manzanita (Arctostaphylos spp.), buckbrush (Ceanothus cuneatus), hill lotus (Lotus humistratus), bicolored monkeyflower (Mimulus bicolor), mountain pretty face (Triteleia ixioides ssp. anilina), and silver hairgrass (Aira caryophyllea).

These sparsely vegetated and non-forested openings where N. prolifera ssp. lutea occurs may be openings that result from thin soils, or they may be due to human disturbances such as logging activities, road building, or housing development. On disturbed sites, the displaced vegetation may return and reduce the suitability of the site to support N. prolifera ssp. lutea, resulting in the decline in numbers and area occupied by N. prolifera ssp. lutea and its possible elimination from the site.

The majority of occurrences are found on the Ledmount soil series, a very shallow, cobbly sandy loam, underlain by hard volcanic breccia. Habitat for N. prolifera ssp. lutea is found on or near rocky ridgelines, saddles, or eroding ephemeral drainages at elevations of 2,325 to 5,160 feet on gentle slopes with aspects of south to west. No plants have been found in pine needle or oak leaf duff.

There are a total of 21 occurrences of N. prolifera ssp. lutea within the project area. Occurrences 03-42, 03-43, 03-44, 03-52, 03-53, 03-54, 03-60 and 03-61 were discovered under a contract with a private botanist (Mary Meyer) in 1982, who did site specific habitat surveys within the Forest and surrounding private lands. Occurrences numbered 03-63, 03-66, 03-67, 03-68, 03-69, 03-72, and 03-73 were located in 1990. Since then other occurrences and extensions (of known occurrences) were discovered during district salvage field surveys. Additional extensions and new locations have been discovered during preliminary surveys of the habitat within the Whale Rock Project area.



### Desired Future Condition

The following description of desired future condition is based on analysis of data collected from known occurrences and modified to meet the site-specific characteristics of those occurrences on the Pacific Ranger District.

Where the combination of suitable soils, aspect, elevation, and topographic position occur as described under suitable habitat, the desired future condition for these types of sites consists of vegetation with the following characteristics: 1) mixed-conifer timber stands with 0 to 10 trees (with dbh > 8 inches) per acre with an understory consisting of clumps of shrubs or scattered individuals, or "low site" with little or no conifers and scattered black oaks and brush species; 2) open patches between trees and shrubs support a thin cover of grasses and forbs, including *N. prolifera* ssp. *lutea*; and 3) the frequency of understory fires varies from 10-30 years.

## **IV. DESCRIPTION OF PROPOSED PROJECT**

The legal description of the proposed project area is T11N, R13E and R14E, and T12N, R13E in the Peavine and Jaybird Compartments of the Lower South Fork of the American River Watershed.

The Whale Rock Forest Health Improvement project proposes to reduce natural fuels through an integrated process of thinning, biomassing and prescribed burning. There are eight alternatives including a No Action alternative. The four action alternatives vary mainly in the miles of fuelbreak created and in the number of acres harvested from natural stands. A table summarizing key differences between the alternatives is included in this biological evaluation (Table 3). For more detailed descriptions of each alternative please refer to Chapter II of the Environmental Impact Statement.

## **V. EXISTING ENVIRONMENT**

The Forest Botanist has reviewed the Region 5 Forest Service Handbook (FSH 2609.25), Amendment No. 1 (USDA Forest Service 1990), the Eldorado National Forest Land and Resource Management Plan (1989), the Eldorado National Forest Soils Resource Inventory (Eldorado National Forest 1989), topographical maps, aerial photos, and Forest and District files and has determined that *Calochortus clavatus* var. *avius* and *Navarretia prolifera* ssp. *lutea* are species of concern for this proposed project. Suitable habitat for *C. clavatus* var. *avius* and *N. prolifera* ssp. *lutea* are described in Section III.

Surveys of varying intensities for both *C. clavatus* var. *avius* and *N. prolifera* ssp. *lutea* have been done within the project area since 1982. A private botanist, Mary Meyers, was contracted to do site specific plant surveys in 1982. Her surveys were concentrated in areas of suitable habitat on both Forest Service and adjacent private lands. She

<b>Table 3. Summary of Key Differences Between Alternative Management Strategies for Sensitive Plants</b>					
Management Activity	Alt A	Alt B	Alt C	Alt D	Alt E
Total Fuelbreaks Planned (Miles)	0	14.5	0	0	14.5
Fuelbreaks Harvested (Acres)	0	914	0	0	914
Natural Stands Harvested (Acres)	0	3181	1986	962	2203
Total Acres Harvested	0	4657	2548	1524	3679
Occurrences Within Proposed Harvest Unit/% of Total <sup>1</sup>	0/ 0%	11/ 30%	4/ 11%	4/ 11%	10/ 27%
Miles of Road (New Const./ Reconstruction)	0 0	1.7/ 29.3	1.0/ 19.2	1.6/ 14.9	2.2/ 32.1
Total Acres Prescribed Burned	0	6303	5623	1765	4510
Occurrences Within Proposed Burns/ Percent of Total <sup>1</sup>	0 /0%	21/ 57%	18/ 49%	11/ 30%	10 /27%

<sup>1</sup>Total number of Sensitive Plant occurrences in the project area is 37.

discovered several occurrences within the Whale Rock Project area. Since then other occurrences have been discovered by Forest Service botanists while doing plant surveys for various timber salvage sales. In 1994 areas within proposed fuel breaks and harvest units for the Whale Rock Forest Health Improvement Project were surveyed by Forest Service botanists. It was during this latest survey activity that occurrence 03-128 was discovered.

### A. Species Account

#### Calochortus clavatus var. avius

There are 16 known occurrences of C. clavatus var. avius within the proposed project area, which is approximately 13% percent of all known locations for this species. These occurrences, numbered 03-23, 03-24, 03-25, 03-34, 03-36, 03-37, 03-42, 03-45, 03-46, 03-55, 03-76, 03-77, 03-80, 03-88, 03-121, 03-128, contain an estimated 3100 plants which represent roughly 21% of the estimated total number of individuals recorded for this taxon on the Forest.

As illustrated in Table 4 (next page), the number of occurrences that are within the area of proposed fuel management activities ranges from eight in Alternatives B to three in Alternatives E.

Alternative B has four C. clavatus var. avius occurrences within proposed harvest units or shaded fuelbreaks, Alternatives C and D have two and Alternative E has three occurrences within proposed harvest units or fuel breaks. These occurrences would be flagged and avoided and timber harvest within them prohibited, unless otherwise authorized in a specific instance by the Forest Botanist to improve habitat conditions and help meet the desired condition.

#### **Navarretia prolifera ssp. lutea**

There are 21 known occurrences of N. prolifera ssp. lutea, within the proposed project area. These occurrences are numbered as: 03-29 03-42, 03-43, 03-44, 03-52, 03-53, 03-54, 03-60, 03-61, 03-63, 03-64, 03-66, 03-67, 03-68, 03-69, 03-70, 03-71, 03-72, 03-73, 03-81, 03-82. The total number of plants in these occurrences is estimated at 67,000. This is 25% of the total number of plants known to exist anywhere. N. prolifera ssp. lutea is an annual species. In any given year the total number of individual plants can fluctuate depending on several factors including variations in climate, and natural and human caused disturbances to the habitat.

The number of N. prolifera ssp. lutea occurrences within the area of the proposed fuel management activities ranges between 13 in Alternatives B to 6 in Alternative D (see Table 4).

The number of occurrences of N. prolifera ssp. lutea that are actually within the boundaries of proposed harvest units or fuelbreaks ranges between eight in Alternative B to two in Alternatives C and D (Alternative E has seven).



Table 4. Occurrences Affected by Proposed Alternatives											
CALOCHORTUS											
Present in Prescribed Fire						Present in Harvest Units					
	A	B	C	D	E		A	B	C	D	E
03-23		X	X	X							
03-24											
03-25											
03-34											
03-36		X	X	X							
03-37		X	X		X			X			X
03-42		X		X	X			X	X	X	X
03-45		X	X								
03-46		X	X	X	X			X	X	X	X
03-55											
03-76											
03-77											
03-80											
03-88		X		X							
03-121											
03-128		X	X					X			
NAVARRETIA											
	A	B	C	D	E		A	B	C	D	E
03-29											
13-42		X	X	X	X			X	X	X	X
03-43		X	X								
03-44											
03-52		X	X	X							
03-53		X	X		X			X			X
03-54		X	X	X	X			X	X	X	X
03-60		X	X		X			X			X
03-61		X	X								
03-63		X	X		X			X			X
03-64											
03-66											
03-67		X	X		X			X			X
03-68											
03-69		X		X							
03-70		X	X	X							
03-71											
02-72											
03-73			X								
03-81		X		X							
03-82		X	X		X			X			X

## B. Habitat Account

### **Calochortus clavatus var. avius**

Potential habitat for C. clavatus var. avius occurs within all south slope areas on the proposed project area. At least 1,720 acres of potential habitat within proposed units (fuelbreaks and harvest units) were surveyed during the 1994 field season by Forest Service botanists. Complete ground coverage has not been achieved in the project area, nor within the Jaybird and Peavine compartments.

### **Navarretia prolifera ssp. lutea**

Potential habitat for N. prolifera ssp. lutea occurs in openings in or adjacent to mixed conifer forests on or near rocky ridgelines, saddles, or eroding ephemeral drainages at elevations of 2,325 to 5,160 feet on gentle slopes with aspects of south to west. These sparsely vegetated and non-forested openings provide suitable and moderately suitable habitat for N. prolifera ssp. lutea on approximately 1280 acres of the proposed project area.

## VI. EFFECTS OF PROPOSED PROJECT

### **Alternative A: No Action Alternative**

#### Direct Effects

There would be no direct adverse effects to sensitive plant occurrences or unoccupied habitat as a result of implementing this alternative. While this alternative does nothing to reduce the risk of a catastrophic, stand-replacing wildfire, such an event would not negatively impact sensitive plants or their habitat. This statement is based on evidence from past stand-destroying wildfires wherein the affected sensitive plant occurrences did not exhibit reduced viability. The wildfires may have increased habitat suitability by eliminating competing brush, groundcover, and herbaceous forbs.

#### Indirect Effects

Beneficial effects to sensitive plant habitat due to reduction in canopy cover and fuel loading, and the use of prescribed fire to eliminate competing vegetation, would not occur with implementation of this alternative.

We conclude that Alternative A would have no beneficial impacts on sensitive plant habitat. There would also be no risk of adverse impacts to individual sensitive plants.

## Alternatives B through E

There is no significant difference in the effects to sensitive plants and their habitat among the range of action alternatives (Alternatives B-E). The implementation of any one of these seven alternatives would have a direct effect on a majority of the sensitive plant occurrences within the Whale Rock Forest Health Project.

### 1. Calochortus clavatus var. avius

A minimum of three (a maximum of eight) occurrences of C. clavatus var. avius located within the proposed project area would be vulnerable to the effects of prescribed fire. In addition to the effects of burning, implementation of certain alternatives places some occurrences within boundaries of proposed harvest units or fuelbreaks (see Table 4). The proximity of these occurrences to the proposed harvest activities places them at risk to damage from equipment and personnel working in adjacent areas. These occurrences would be flagged and entry avoided unless it is deemed beneficial to the sensitive plants or their habitat.

#### Direct Effects

The proposed project may result in the loss of some individual plants. In all the alternatives there are plant occurrences within the boundaries of either harvest units or fuelbreaks. Because these occurrences are in areas where harvest activities and road and landing construction/reconstruction will be ongoing, the possibility exists of an accidental loss of 0 to 500 plants. Mitigation measures will be implemented that will greatly reduce the possibility of this happening. These measures include the following:

Plant occurrences within harvest units or fuelbreaks will be designated as Controlled Areas and the areas will be flagged and entry by workers and equipment will be avoided unless timber harvest is deemed beneficial by the Forest Botanist in which case activities would only occur during the period of time that this plant is dormant (after August 15). During this time, only those actions that disturb the soil to a depth of 4 inches or more are likely to affect the bulbs of this plant. Directional felling, endlining, and skid trail layout would be coordinated in the field with a botanist to further minimize impacts. Monitoring of similar management practices in the Cleveland Fire area indicates that C. clavatus var. avius is able to tolerate this level of disturbance.

In addition, individual plants may be lost through activities associated with prescribed fire. These would be short term impacts and are not likely to result in a substantial decline in the size of C. clavatus var. avius occurrences, nor would they reduce the viability of this sensitive plant species. This conclusion is based on the following:



Experience with other prescribed fires on the Eldorado National Forest has demonstrated that C. clavatus var. avius is able to tolerate both spring and fall burns with no detectable changes in plant density.

#### Indirect Effects

Adverse effects to C. clavatus var. avius habitat may occur due to soil disturbance resulting from ground based harvest equipment. Soil disturbance can result in opportunities for the establishment of non-native and invasive plant species (exotic weeds). These weeds have the potential to compete with sensitive plants for sunlight, water and nutrients. The magnitude of this impact is impossible to predict since it is contingent on the introduction and establishment of weedy plant species, an event that may or may not occur. The use of prescribed fire at intervals of five to ten years may reduce this potential impact by controlling the density and distribution of fire-intolerant weeds.

Habitat for C. clavatus var. avius would be enhanced in the long-term by the proposed treatments for fuels, fuelbreak establishment and maintenance, and thinning of timber stands. Collectively, these actions contribute to the attainment of the desired conditions for these sensitive plants; i.e., open timber stands with fire return intervals of less than 15 years. The resulting forest structure would provide opportunities for recruitment and establishment of this sensitive plant species within unoccupied suitable habitat and would enhance the habitat capability of existing C. clavatus var. avius.

#### Cumulative Effects

There are future management activities planned across the Pacific Ranger District in compliance with the Eldorado National Forest Land and Resource Management Plan (LRMP). These activities include timber harvest, biomass removal, prescribed burning, precommercial thinning, vegetation control, livestock grazing, OHV use, and animal damage control. In addition, past management activities have occurred both across the Pacific Ranger District and within the project area, which include the above mentioned activities as well as road construction and fire suppression. Road construction, logging, OHV use, and fire suppression have reduced the amount and quality of C. clavatus var. avius habitat. The proposed actions would not contribute to these adverse impacts and would begin to compensate for the impacts associated with fire suppression.

## **2. Navarretia prolifera ssp. lutea**

At least 7 of the 21 occurrences of N. prolifera ssp. lutea located within the proposed project area would be vulnerable to the effects of prescribed fire. In addition to effects of burning, implementation of certain alternatives places some occurrences within the boundaries of proposed harvest units (see Table 4). The proximity of these occurrences to the proposed harvest activities places them at risk to damage from equipment and personnel working in adjacent areas. These occurrences would be flagged and entry avoided unless it is deemed beneficial to the sensitive plants or their habitat.

### Direct Effects

Implementation of this project may result in the loss of some individual plants through activities associated with the timber harvest, fuelbreak establishment, road and landing construction, and prescribed fire. These would be short term impacts caused by the physical action of cutting and removing of trees, and from the implementation of prescribed burning during the time of year that the plants are actively growing and susceptible to fire and heat. If the burning is implemented in the fall, adverse effects to N. prolifera var. lutea would be minimized as this annual species has its seeds safely stored in the soil.

There will be direct effects to some occurrences of N. prolifera var. lutea that have established on old road beds previously constructed within the occurrence (03-43). N. prolifera ssp. lutea is sometimes found occupying old road beds and landings.

Occurrences 03-60 and 03-71 may be affected by the reconstruction of Forest Service Road 11N56A. Habitat along the edges of this road may be lost. This estimated 1/2 acre loss of plants/habitat would not substantially affect the viability of these occurrences. This assessment is based on the fact that the main bodies of both occurrences are located away from the old road site and will be avoided. Scheduling the road reconstruction for a time after the plants have set seed will allow for the creation of seed banks and hence the reestablishment of navarettia along the edges of the road.

Occurrence 03-54 is located within a plantation to be thinned. The natural habitat here has been used for a road and a landing prior to discovery. It has not been included within the protected lava cap areas. The proposed thinning and use of a road and landing associated with the harvest activities would have the following effect on occurrence 03-54. Whereas direct effects may occur and the loss of some individual plants is likely, this loss of individuals would not result in a substantial decline in the size of N. prolifera ssp. lutea occurrences, nor would it reduce the viability of this sensitive plant species. This conclusion is based on the fact that the post-project environment would provide suitable habitat for this species and would not result in a loss of this occurrence.

### Indirect Effects

Adverse effects to N. prolifera ssp. lutea habitat may occur due to soil disturbance resulting from ground based harvest equipment. Soil disturbance can result in opportunities for the establishment of non-native and invasive plant species (exotic weeds). These weeds have the potential to compete with sensitive plants for sunlight, water and nutrients. The magnitude of this impact is impossible to predict since it is contingent on the introduction and establishment of weedy plant species, an event that may or may not occur. The use of prescribed fire at intervals of five to ten years would reduce this potential impact.

Habitat for N. prolifera ssp. lutea would be enhanced in the long-term by the proposed treatments for fuels, fuelbreak establishment and maintenance, and thinning of timber stands. Collectively, these actions contribute to the attainment of the desired future conditions of these sensitive plants. The resulting forest structure would provide opportunities for recruitment and establishment of this sensitive plant species within unoccupied suitable habitat and would enhance the habitat capability of existing N. prolifera ssp. lutea.

#### Cumulative Effects

There are future management activities planned across the Pacific Ranger District in compliance with the Eldorado National Forest Land and Resource Management Plan (LRMP). These activities include timber harvest, biomass removal, prescribed burning, precommercial thinning, vegetation control, livestock grazing, OHV use, and animal damage control. In addition, past management activities have occurred both across the Pacific Ranger District and within the project area, which include the above mentioned activities as well as road construction and fire suppression. Road construction, logging, OHV use, and fire suppression have reduced the amount and quality of N. prolifera ssp. lutea habitat. The proposed actions would not contribute to these adverse impacts and would begin to compensate for the impacts associated with fire suppression.

Suitable habitat for Navarretia prolifera ssp. lutea depends on the maintenance of open areas with little competing vegetation. The use of prescribed fire to maintain such habitat characteristics would be beneficial for this sensitive plant species and would provide added opportunities for recruitment and establishment of this taxon.

### **VII. DETERMINATION**

#### **For Sensitive Species**

Implementation of Alternative A, the No Action Alternative, would have no effect on Calochortus clavatus var. avius, Navarretia prolifera ssp. lutea, Phacelia stebbinsii, or Lewisia serrata.

Implementation of Alternatives B through E is not expected to adversely impact known occurrences of C. clavatus var. avius, N. prolifera ssp. lutea, P. stebbinsii, or L. serrata. While implementation of any of these alternatives may impact individuals of C. clavatus var. avius and N. prolifera ssp. lutea, these impacts will not result in a loss of viability or contribute to a trend toward federal listing.

#### **For Proposed Species**

It is our determination that implementation of any of the alternatives will not affect Senecio layneae or its proposed critical habitat.



### VIII. MANAGEMENT RECOMMENDATIONS

1. Implementation monitoring will be conducted to assure that the mitigation measures for sensitive plant species were implemented as described in the Environmental Impact Statement.
2. Effectiveness monitoring will be conducted to determine if the proposed mitigation measures were effective in reducing or avoiding impacts to sensitive plant species.

This appendix has documented the completion of the steps outlined in the Regional Office direction and the 2670 section of the USFS Manual regarding Biological Evaluations for Sensitive Plant Species for this project.

### IX. REFERENCES

- Eldorado National Forest. Species Management Guide for Navarretia prolifera ssp. lutea. 1985.
- Eldorado National Forest. Draft Eldorado National Forest Soil Resource Inventory. 1989.
- Eldorado National Forest. Sensitive plant habitat and occurrence maps, and unpublished occurrence records. 1994.
- Eldorado National Forest Land and Resources Management Plan. 1989.
- Farwig, Stan. Calochortus horticulturalist. Personal communication. 1991.
- Federal Register. Volume 58, Number 188. 1993.
- USDA Forest Service. Forest Service Manual: Wildlife, Fish, and Sensitive Plant Habitat Management (section 2670), WO Amendment 2600-90-1. 1990.
- USDA Forest Service. Threatened and Endangered Plants Program Handbook (R-5 FSH 2609.25) Amendment 1, Exhibit 1: R-5 Sensitive Plant Species. 1990.
- USDI Fish and Wildlife Service. Species list. October 7, 1994.

**SUPPLEMENTAL INFORMATION ON  
MITIGATION MEASURES FOR SENSITIVE PLANTS  
AND MAP SHOWING  
LAVA CAP PLANT HABITAT BURN AREAS  
IN THE WHALE ROCK PROJECT AREA**

**ELDORADO NATIONAL FOREST  
PACIFIC RANGER STATION**

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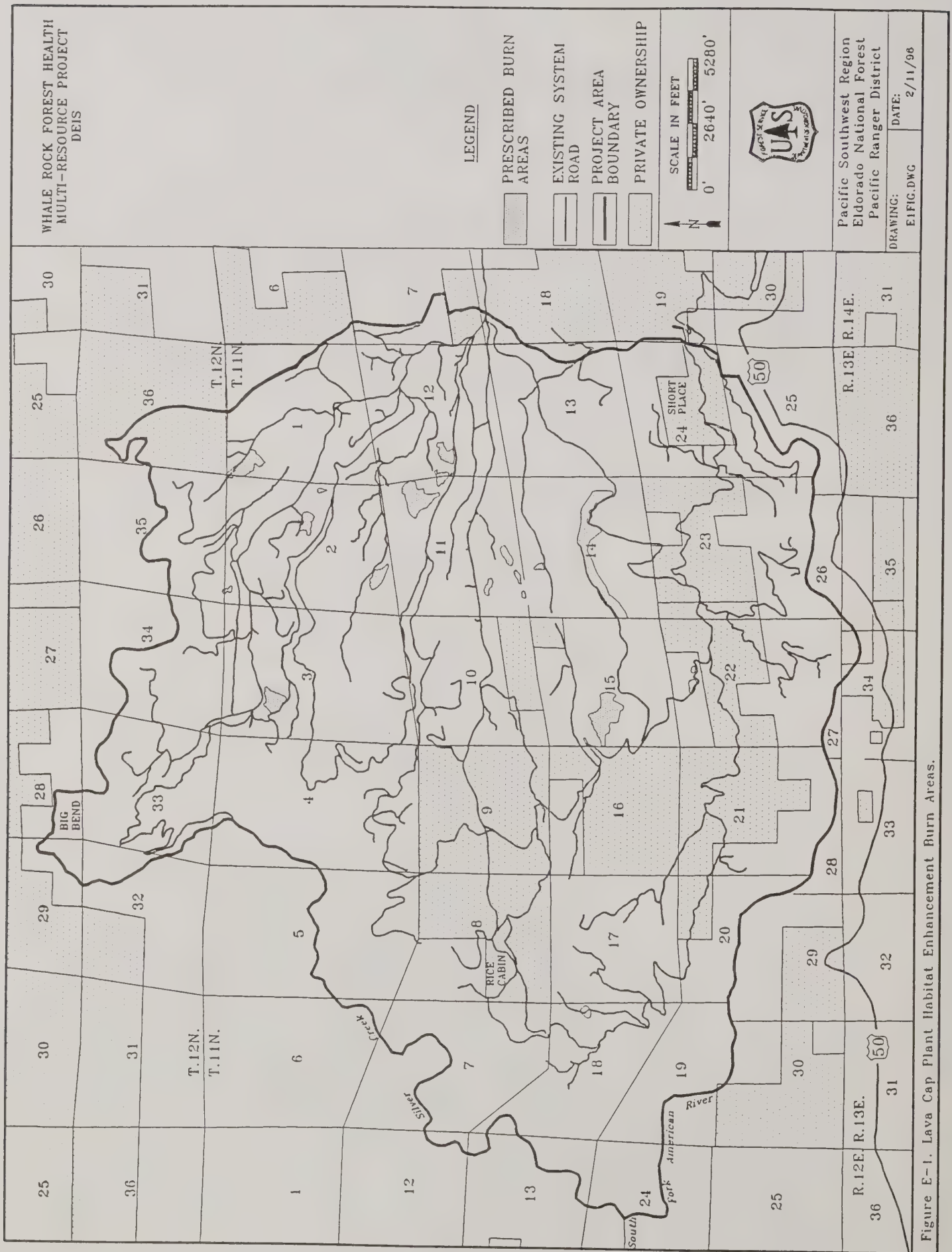


**SUPPLEMENTAL INFORMATION  
REGARDING SENSITIVE PLANT MITIGATION**

Sensitive plant occurrences designated by the Forest Botanist within the analysis area will be identified as Controlled Areas in the timber sale contract and will be flagged on the ground and entry by heavy equipment avoided. It may be necessary to enter some occurrences for harvest or fuel reduction purposes to retain the habitat values necessary for the occupying sensitive plant species (see Figure E-1). Only those actions that have been determined by the Forest Botanist to be favorable for habitat maintenance or enhancement will be allowed. Maps providing detailed locations of these Controlled Areas and associated mitigation measures are filed in the Forest Sensitive Plant Records at the Supervisor's Office in Placerville.

Management Activity	Mitigation Measures to Avoid and/or Reduce Impacts
Timber Harvesting/Biomass	No landing construction or ground-based equipment in Controlled Areas. Limited operation period* for harvest activity within Controlled Areas. Forest botanist field review of timber marking, directional felling and endlining within Controlled Areas.
Fuels Management	Acceptable fuels management treatment within Controlled Areas limited to jackpot burning and/or lop and pile; burning dates and locations for piling to be coordinated with botanist. Forest botanist field review of directional felling, endlining, underburning or mechanical treatment for establishment of proposed shaded fuelbreak system within Controlled Areas; prescribed burning implementation dates to be coordinated with the Forest botanist.
Road Construction	No new road construction in Controlled Areas. Limited operating period* for reconstruction activities within Controlled Areas unless otherwise recommended by Forest Botanist, at which point reconstruction limited to existing road prisms; effective road closure of reconstructed roads following completion of management activities. Limited operating period* for putting roads to bed within Controlled Areas; Forest botanist to review and provide input for species mix and methods for road revegetation.
Soil Stabilization	No subsoiling or ripping to treat soil compaction within Controlled Areas. All soil stability and erosion control measures within Control Areas to be approved by the Forest botanist prior to implementation.

\* No activity between : 12/1 to 8/15 for Pleasant Valley mariposa lily  
12/1 to 7/1 for yellow bur navarretia



**APPENDIX F**

**SUPPLEMENTAL INFORMATION ON  
FIRE, FUELS AND AIR QUALITY  
FOR THE WHALE ROCK PROJECT**

ELDORADO NATIONAL FOREST  
PACIFIC RANGER DISTRICT



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## APPENDIX F

### FIRE, FUELS AND AIR QUALITY

#### LARGEST PROBABLE CATASTROPHIC WILDFIRE

The largest probable catastrophic wildfire acreage refers to the largest probable contiguous acreage of catastrophic results from a wildfire. The largest probable catastrophic wildfire acreage for each alternative was determined by the following method and reasoning.

The areas which will be prescribed burned were delineated on a map for each alternative. After the second entry of prescribed burning, the fuel loading, horizontal fuel continuity, and vertical fuel continuity would be reduced to a level such that fire intensity, flame lengths, and lethal scorch heights on the remaining vegetation would result in significantly less loss than on the remaining stand which had no fuel reduction. Therefore a wildfire in the prescribed burned areas would be a surface fire with flame lengths of about 4 feet.

Next, the largest contiguous blocks of land remaining outside of the prescribed burn areas were delineated for each alternative. Since these areas have not been prescribed burned or the fuel loading and fuel ladder have not been reduced by mechanical means, the fire intensity, flame lengths, and resulting scorch heights would be catastrophic to the ecosystem. A wildfire could quickly make the transition from a surface fire to a crown fire in these areas, with flame lengths of the surface fire exceeding 11 feet and flame lengths of a crown fire exceeding 300 feet. Entire homogeneous blocks of land would have all vegetation killed, leaving only the skeletons of the trees.

The large contiguous block of land remaining outside of the prescribed burn areas would represent the area of **catastrophic results**, where the areas which had been prescribed burned would not be catastrophic when a wildfire spread into these areas. A single fire may be larger than the largest probable catastrophic wildfire, since the areas within the prescribed burn zone would not have catastrophic results even though these areas may have wildfire spread onto them. In the prescribed burn areas, single trees may torch but the wildfire would largely be a surface fire with lower flame lengths and fire intensities than those areas which had not been prescribed burned. The lower flame lengths from a wildfire in the prescribed burned areas would allow suppression forces to be effective and contain the fire very rapidly after the wildfire entered these areas.

Below are guidelines for fire suppression difficulty which are taught in fire behavior and tactic classes (Rothermel 1983):

Flame lengths of 4 feet could be attacked by persons using handtools and their fireline should hold the fire.

Flame lengths of 4 to 8 feet could be attacked using equipment such as dozers, engines, and retardant aircraft and should be effective in suppressing a fire.

Flame lengths of 8 to 11 feet present serious control problems such as wide scale torching, crowning and spotting; suppression is difficult and usually ineffective.

If flame lengths are greater than 11 feet, crowning, torching, and major fire runs are probable, and no suppression action is effective on the head of the fire.

Areas where it would be unlikely for wildfire to spread to or areas where suppression efforts would be successful were also removed from the largest probable catastrophic wildfire areas. Such places would be along the north aspect of Silver Creek, where the fine fuel moisture is high and offers little exposure to the sun for solar heating, and areas which are mostly surrounded by treated areas. Lava caps which have little vegetation are other areas which have been removed from the largest catastrophic wildfire areas.

#### **FUEL LOADING**

The existing fuel loading, expressed as tons per acre, was estimated using "Photo Series for Quantifying Forest Residues, USDA Forest Service General Technical Reports PNW-52, PNW-56, PNW-95 and PNW-105 for fuel sizes 9 inches or less in diameter. Debris greater than 10 inches in diameter was tallied using the Forest Inventory Analysis (FIA) protocol for determining the down log component; only logs greater than 10 inches in diameter and at least 10 feet long were counted. Fuel loading in natural stands on north slopes in the project area were found to average 60 tons per acre. Fuel loads in natural stands on south slopes average 38 tons per acre. Fuel loads in the Blair area of Whale Rock, which was prescribed burned in 1995 (and twice prior to 1995), had substantially reduced fuel loads averaging 9 tons per acre.



### **FIRE POTENTIAL**

Given the fuel loads present in the project area, the history of fire ignitions within the area (i.e., a 400% increase in person-caused fires in the last 18 years), and the response time for an initial attack suppression engine to reach the center of the project area (30 minutes), the Whale Rock area is currently at high fire vulnerability. Fire behavior modeling – which factors area characteristics such as fuel sizes, fuel types, presence of ladder fuels, percent of canopy closure, and weather – indicates the high probability that a large, high intensity, stand-replacing fire will occur in the area if fuels are not substantially reduced.

### **REFERENCES**

Anderson, H. E.

1982 Aids to Determining Fuel Model for Estimating Fire Behavior. USDA General Technical Report INT-122.

Rothermel, Richard C.

1983 How to Predict the Spread and Intensity of Forest and Range Fires. USDA Forest Service, Intermountain Forest and Range Experiment Station General Technical Report INT-143. Ogden, Utah.

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## **APPENDIX G**

### **SUPPLEMENTAL WATERSHED INFORMATION**

### **FOR THE WHALE ROCK PROJECT AREA**

ELDORADO NATIONAL FOREST

PACIFIC RANGER DISTRICT



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## **APPENDIX G**

### **WATERSHED INFORMATION**

#### **INTRODUCTION**

This appendix includes some additional background information pertaining to the Cumulative Watershed Analysis (CWE) that was completed on the Whale Rock Project. Included in this section is a discussion of some of the characteristics of the CWE computer model ERODA and some of the assumptions that were used in the Whale Rock CWE analysis. (For an in-depth review of the entire CWE model and process, see the Draft Eldorado National Forest Cumulative Off-Site Watershed Effects Analysis Process, Version 1.1, June 1993.) Several charts and graphs are also included that provide an overview, by watershed, of the acreages of the more significant activities being proposed in the various alternatives.

Several basic assumptions were made when analyzing hydrologic effects. These include the following:

- a. Maintenance of healthy riparian areas and implementation of watershed improvement and restoration practices will make watersheds less susceptible to the impacts of land use.
- b. A disturbance level kept below the TOC is assumed to be sufficient to protect the beneficial uses within a planning watershed. The level of CWE risk is initially assigned based on modeled output, but the actual determination of risk must depend on an assessment of the physical and biotic conditions within a given watershed. Management activities in watersheds with high disturbance levels must be carefully planned in order to protect beneficial uses.
- c. Implementation of BMPs will be effective in preventing accelerated erosion which could adversely affect beneficial uses of water.
- d. Providing for protection of beneficial uses within the project area implies that beneficial uses further downstream will also be protected. Effects on downstream beneficial uses that result from activities in the project area will not be any greater than those effects on beneficial uses within the project area.
- e. While municipal, domestic and recreational beneficial uses of waters are a concern, the focus of the analysis is to evaluate the potential risk to local beneficial uses of water including the aquatic communities within each of the smaller watersheds within the Whale Rock project area.

The validity of these assumptions is subject to verification through the use of the Best Management Practices Evaluation Program (BMPEP). The BMPEP is a region-wide program under which sites selected at random are monitored to assess the effectiveness of management practices. This provides a level of quality control that assures the information needed to improve management practices and correct any problems is available. A monitoring plan is included for the Whale Rock project to assess the effectiveness of specific mitigation measures.

### **CWEs, THE ERODA MODEL AND WHALE ROCK**

In reviewing the predicted cumulative effects discussion in the hydrology section of the various alternatives, the reader should have a clear understanding of the assumptions, implications and limitations of the model. The following discussion is intended to provide important clarification concerning the determination of the ERA percentages calculated on the Whale Rock project.

- 1) In order to model the most realistic situation possible, the Whale Rock CWE calculations assume that the area is broken up into four projected timber sale areas, each assigned dates for harvesting and post-harvest activities. By dividing the activities up by projected sales in each watershed, a modeled display of the cumulative effects was achieved, with the data generated more closely equaling the expected sequence of activities.
- 2) Forest hydrologists and foresters have discussed the need to determine the appropriate CWE coefficients to be used for CASPO harvest prescriptions, but as of the date of this document, no new coefficients have been agreed on. Rather than use new coefficients, the Whale Rock CWE calculations use the coefficients that are considered appropriate for conventional, commercial thinning prescriptions. These conventional thinnings are usually described as crown thinnings. Although the coefficients used for the CASPO prescriptions are the same as those used for conventional crown thinnings, the actual harvest prescriptions and the hydrologic effects of those prescriptions are decidedly different. Crown thinnings and CASPO prescriptions will both usually involve the removal of a predetermined basal area. Crown thinnings normally prescribe that the selection of trees to be thinned will be based upon a number of factors, such as vigor, crown position, species and spacing. Crown thinnings typically involve the removal of trees in the co-dominant, dominant and predominant crown positions, as well as trees from the suppressed and intermediate crown positions. However, CASPO prescriptions limit the application of selection criteria to those trees in the smallest diameter classes, which means that the preponderance of the trees to be removed in a CASPO prescription will come from the understory suppressed and intermediate trees with only an occasional tree removed from the co-dominant size class.

Understory, shade-tolerant tree species are more "economical" in terms of transpiration efficiency compared to the light demanding species. Understory trees are oftentimes suppressed, maintaining smaller, thinner crowns that transpire and use less moisture. In addition, the understory is heavily shaded and not subject to the moisture stress and



water consumption caused by full sunlight. Per unit of basal area removed, the understory also has a smaller effect upon forest evaporation, interception and sublimation than overstory trees. The net result is that the removal of a given basal area under a CASPO prescription would have smaller effects upon the hydrologic factors that are embodied in the cumulative watershed effects model than the removal of an equal basal area in a crown thinning. Also, the time needed for a site to return to its preharvest hydrologic condition would be considerably longer after a crown thinning than a CASPO thinning. This is because the removal of dominant or co-dominant trees would normally create canopy openings that can only be filled by the expansion of the crowns of the residual trees. These openings would affect the hydrologic function of the timber stand by changing amounts of precipitation-through-fall and interception. Few openings in the upper canopy would be created by most of the CASPO prescriptions planned on Whale Rock, thus the role of the upper canopy in the hydrologic cycle is largely uninterrupted and stand recovery is very rapid. The net effect of using the crown thinning coefficient in the CWE model for a CASPO thinning prescription is that cumulative effects are overstated by the model.

**3)** As discussed in Chapter III, the Whale Rock project area has been subject to considerable salvage harvesting. Unlike normal green tree harvesting, salvage "units" tend to be much larger and certainly not discretely defined. Salvage is usually extensive rather than intensive. Because of the widespread nature of salvage operations and the fact that units are usually not defined on the ground, record keeping is very difficult in terms of documenting the exact locations harvested. Large areas are usually identified as having been salvaged, when in fact only portions of the area were actually disturbed. In terms of the CWE model, the coefficients used for salvage reflect the fact that harvest tends not to be particularly intense. However, from a record-keeping standpoint, the actual amount of acreage affected by salvage is usually overestimated. This occurs because there is simply no efficient way of actually measuring, recording or calculating the acreage affected; therefore, areas are simply blocked off on maps and the acreage estimated accordingly.

The net result is that the ERAs resulting from salvage harvesting tend to be overestimated. It is probably impossible to determine the amount of overestimation and it may vary from area to area. However, because of the high amount of previous insect mortality in the Whale Rock area, salvage has been significant and therefore the amount of ERA overestimation may be substantial. For example, approximately 23% of the existing ERA in the Soldier Creek Watershed is identified as being caused by previous salvage operations. No correction to this situation is possible, but the reader should understand that this overestimation tends to increase the estimate of the existing ERA.

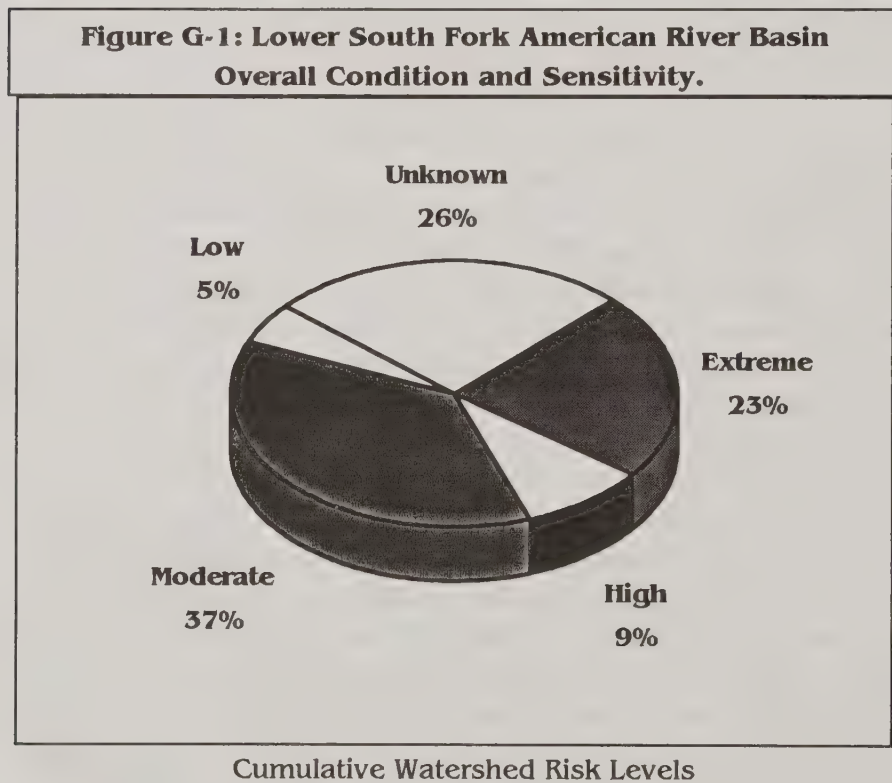
In summary, the intent of the above is not to discredit the CWE model being used to calculate watershed risks; rather, it is intended to emphasize the fact that the model tends to provide liberal estimates of the expected or existing ERAs. Where there is doubt, estimates are made on the side of assuming greater effects or risks than what may actually be present. The reader must therefore view the modeled results cautiously.

The intent of the CWE model is to alert us of potential risks before they occur. The model's intent is not to control management activities on the basis of modeled results.

### EXISTING CONDITIONS

Cumulative Watershed Effects (CWEs) have been evaluated using the USFS Region 5 CWE methodology as amended by the Eldorado National Forest (Carlson and Christiansen 1993) for most of the watersheds within the basin. Figure G-1 displays a summary of these results to illustrate overall condition and sensitivity of this portion of the South Fork American River.

#### LOWER SOUTH FORK AMERICAN RIVER WATERSHED



The following information is extracted for the seven affected watersheds from the 1994 EA Environmental, Science and Technology CWE reports. The information is presented in this Appendix for convenience; the entire CWE report is available for review at the Pacific Ranger Station or the Supervisor's Office of the Eldorado National Forest.

## **SOLDIER CREEK WATERSHED**

### ABSTRACT

A Cumulative Off-Site Watershed Effects (CWE) Analysis for the Soldier Creek Watershed was conducted to assess the potential risk of adverse CWEs. The Soldier Creek Watershed is located in the Pacific Ranger District, approximately 16.5 miles east of Placerville, California. This watershed encompasses approximately 3,491 acres (5.5 square miles), of which 67 percent (2,332 acres) is owned by the USDA Forest Service and the remaining 33 percent (1,159 acres) is privately owned. Downstream beneficial uses of water include municipal and domestic water supplies, hydroelectric power, recreational uses, cold-freshwater habitat, cold-water spawning, and wildlife habitat. Soldier Creek is a tributary of the South Fork of the American River. Approximately 2.3 miles of the creek are considered Class II, and 10.1 miles are Class III. The remainder of the creek is Class IV.

A stream survey of the lower portion of the mainstem Soldier Creek, conducted by the Forest Service in 1974, indicated that aquatic habitat conditions were generally in good to excellent condition at that time, with fair numbers of rainbow trout observed in the fish-bearing portion of the stream. Additional stream sections surveyed in 1990 indicate that timber and road building activities have negatively impacted the upper part of the watershed.

The watershed has been determined to have a High natural sensitivity (Natural Sensitivity Index of 57), with a Threshold of Concern (TOC) of 12-14 percent Equivalent Roaded Acres (ERA). The current level of land disturbance is 14.3 percent ERA, which exceeds the threshold of concern. Comparison of the current ERA with the watershed's TOC indicates a Very High risk of adverse Cumulative Watershed Effects (CWE).

It is recommended that the basin be surveyed for Watershed Improvement Needs (WIN) and that restoration projects be pursued actively to reduce any cumulative watershed effects on the beneficial uses of the water of the watershed. Also, ongoing land-disturbing projects should be reviewed to determine if additional mitigation beyond standard BMPs and Forest LRMP standards and guidelines are needed to prevent occurrence of negative cumulative effects on the aquatic resources of the watershed.

### DISCUSSION

The Soldier Creek watershed has an NSI value of 57, indicating that the watershed has a High sensitivity to disturbance. Significant areas of soils classified as Hydrologic Soil Groups C and D and as soils prone to gully erosion, the presence of stream channels with ratings of high and extremely high instability based on the Pfankuch stability index, and the possibility of rain-on-snow precipitation cause the watershed to be highly



susceptible to increased sediment delivery from erosion. The TOC for this watershed is 12-14 percent ERA.

The 1990 stream survey indicated that the stream channel was relatively stable in the section from 3,840 ft elevation to 3,960 ft and unstable in sections of the main channel further upstream. Although no Pfankuch ratings are available for the section from the mouth to 3,840 ft, a 1974 survey indicated that it was fairly stable at that time. The 1990 survey noted several areas of extreme bank scour, pools collecting silt, and a road located too close to the stream. A general comment was that the stream buffer seemed inadequate in the ephemeral portion of Soldier Creek. Since the 1974 stream survey, a large number of land disturbance activities, both clearcutting and site preparation, have occurred in the watershed. Aerial photos taken in 1991 show that the Soldier Creek Watershed has had extensive harvest operations. In particular, two harvest units on private land show a dense network of skid trails.

It is assumed that livestock grazing was not having a significant adverse effect on CWE in the Soldier Creek Watershed, since there was no mention of a problem in the field survey reports. Livestock grazing in riparian areas was taken into account in the ERA calculation.

The current land disturbance value of 14.3 percent ERA, reflecting activities within the watershed since 1960, is more than 100 percent of the higher end of the TOC range. Thus, there is a Very High risk for the occurrence of adverse CWE in the Soldier Creek Watershed. Observations by a channel survey crew in 1990 reflect the fact that portions of the stream have degraded since a 1974 stream survey, indicating that the watershed is at or above the TOC for occurrence of adverse CWE.

#### CONCLUSIONS AND RECOMMENDATIONS

Because there has been a high level of management activity within the watershed since the early 1960s, and a recent stream survey indicated that adverse CWE are occurring, the CWE susceptibility of the watershed is rated as Very High risk. The soil types, natural channel stability, and climatic regime give the watershed a naturally high sensitivity to land-disturbing activities.

Based on the observation of fines in channel substrates by the 1990 survey crew, this watershed appears to be in the early stages of CWE impacts. Without the protection of sensitive soil areas, careful review of land management activities, and implementation of restoration projects where necessary, the condition of an aquatic ecosystem can quickly deteriorate. The following recommendations are made to assist the Forest Service in minimizing additional adverse CWE within the Soldier Creek Watershed:

1. If land-disturbing activities are currently ongoing in the watershed, review projects for need of additional mitigation beyond standard BMPs and Forest LRMP standards and guidelines. This would include widening buffer strips

adjacent to land slides, ripping skid trails and landings, and mulching disturbed areas near stream channels.

2. Conduct additional stream surveys of Soldier Creek which include Little Soldier Creek and the section from the mouth of the stream to an elevation of 3,440 ft. These surveys should evaluate both the biological and physical conditions of the stream.
3. Conduct a WIN inventory to identify any restoration needed, and begin projects to lessen the potential for adverse CWE.
4. Evaluate the condition of the riparian zone to determine if there are impacts from grazing.
5. Monitor effects of restoration work and ongoing land disturbing activities to have a continuing assessment of CWE conditions.

## **PACIFIC HOUSE**

### ABSTRACT

An analysis of Cumulative Off-Site Watershed Effects (CWE) was conducted for the Pacific House Watershed to assess the potential risk of adverse CWE. The Pacific House Watershed is located in the Placerville, Georgetown and Pacific Ranger Districts, but primarily the Placerville Ranger District, approximately 15 miles east of the city of Placerville, California. The watershed encompasses approximately 8,344 acres (13.3 square miles). The USDA Forest Service owns 5,335 acres (8.5 square miles), and 3,009 acres (4.8 square miles) are privately owned. Beneficial downstream water uses include municipal and domestic water supplies, hydroelectric power, recreational uses, cold freshwater habitat, cold-water spawning habitat, and wildlife habitat.

The Pacific House Watershed is a 'main stem' watershed, through which the South Fork American River flows. There are approximately 10 miles of Class I streams, 0.8 miles of Class II, 14 miles of Class III, and an undetermined number of miles of Class IV streams. The lowermost 0.7 mile reach of Soldier Creek is included in the Pacific House Watershed, and it was part of an aquatic survey of Soldier Creek in 1974. The Pacific Gas and Electric Company (PG&E) has two fish population sampling stations on the South Fork of the American River within this watershed. The South Fork American River flows through several small reservoirs on its way to Folsom Reservoir.

The watershed has been determined to have a Very High Natural Sensitivity Index (NSI 172), corresponding to a Threshold of Concern (TOC) of 10-12 percent Equivalent Roaded Acres (ERA), in part because of the large percentage of inner gorge and soils susceptible to erosion within the watershed. The current level of land disturbance of 5.1 percent ERA suggests a Moderate Risk for adverse Cumulative Watershed Effects (CWE).

However, the outdated stream survey information available within this watershed for this CWE analysis results in a rating of Unknown Risk.

It is recommended that a comprehensive stream survey be conducted in the watershed to assess the CWE of watershed disturbances that have occurred since the 1974 stream survey.

### DISCUSSION

The Pacific House Watershed has an NSI value of 172, indicating that the watershed has a Very High sensitivity to disturbance. The presence of significant areas of inner gorge, soils prone to gully erosion, soils classified as Hydrologic Soil Groups C and D, and soils having very high erosion hazard (EHR) cause the watershed to be very susceptible to increased sediment delivery from erosion. The TOC for this watershed is 10-12 percent ERA.

The PG&E surveys indicate moderate numbers of fish in the South Fork of the American River in this watershed. The PG&E surveys do not include an evaluation of geomorphic stream condition. The 1974 stream survey of the portions of Soldier Creek and Silver Creek that occur in this watershed indicated that the stream channel was moderately stable. However, land disturbance records indicate that about half of the land-disturbing activity in the watershed has taken place since the 1974 survey. This activity has potential for impacts on Soldier Creek and the South Fork American River.

The 1974 stream survey did not evaluate the impact of grazing or the sand/gravel pit on the riparian or meadow areas.

The current land disturbance value of 5.1 percent is more than 50 percent of the lower end of the TOC range. The mathematically derived ERA number, when compared to the TOC, suggests a Moderate Risk of the probable adverse CWE occurring. However, since no stream condition survey information is available since the 1974 survey, an Unknown Risk rating for adverse CWE is assigned.

### CONCLUSIONS AND RECOMMENDATIONS

Because of the poor quality of stream survey information within the watershed, the CWE risk rating is Unknown. The soil types and geomorphic conditions of the watershed give the watershed a Very High sensitivity to land-disturbing activities. The ERA/TOC comparison, which indicates a Moderate Risk rating, is based solely on a mathematical model. While the model is an important management tool, its results must be viewed in conjunction with what is observed on the ground and what is seen on maps and aerial photographs. Watershed condition must be measured in terms of both physical and biological parameters to assess the impacts from management activities.

Without the protection of sensitive soil areas and careful review of future land management activities, the present condition of the aquatic ecosystem could



deteriorate. The following recommendations are made to assist the Forest Service in minimizing adverse CWE within the Pacific House Watershed:

1. Manage sensitive areas with the primary objective of maintaining or improving soil productivity, slope stability, and water quality. In the Pacific House Watershed this would include retaining adequate ground cover on steep and/or highly erosive soils and maintaining healthy riparian stands along tributaries and mainstem channels.
2. Conduct a stream survey of the South Fork American River and Soldier Creek to assess current stream channel conditions. Include Rosgen channel type and Pfankuch channel condition surveys.
3. Evaluate stream channel condition in the riparian and meadow areas to determine if there are impacts from grazing.
4. Conduct a WIN inventory to identify and plan restoration where needed.

## **JAYBIRD**

### **ABSTRACT**

An analysis of Cumulative Off-Site watershed Effects (CWE) was conducted for the Jaybird Canyon Watershed to assess the potential risk of adverse CWE. The Jaybird Canyon Watershed, located in the Pacific Ranger District approximately 17 miles northeast of Placerville, California, encompasses approximately 1,652 acres (2.6 square miles), all of which is managed by the U.S. Forest Service. Beneficial downstream water uses include municipal and domestic water supplies, hydroelectric power generation, irrigation, recreation, cold freshwater habitat, coldwater spawning habitat, and wildlife habitat.

The major aquatic feature of the watershed is Jaybird Canyon Creek, a second order cold-water perennial stream that flows into Camino Reservoir. Jaybird watershed includes approximately 5.2 miles of Class III streams, with the remaining being Class IV streams. A stream survey of Jaybird Canyon Creek conducted by the Forest Service in 1979 indicated that the aquatic habitat and channel geomorphology were in fair to good condition, although no fish were found in the survey. There are impassable barriers for fish passage in the stream channel and this may be the cause of no fish being observed in the 1979 survey.

The watershed has a Moderate Natural Sensitivity Index (NSI 49), corresponding to a Threshold of Concern (TOC) of 14-16 percent Equivalent Roaded Acres (ERA). The current level of land disturbance, based on records dating from 1960, is 8.3 percent ERA. Comparison of this mathematically derived ERA value suggests a Moderate Risk

rating for adverse Cumulative Watershed Effects (CWE). There has been no field information collected on stream channel condition since a 1979 stream survey, so the quality of information to evaluate current stream conditions is poor. Thus, the risk of occurrence of adverse CWE is rated Unknown.

It is recommended that a comprehensive stream survey be conducted to assess the effects of the watershed disturbances that have taken place since the 1979 survey.

### DISCUSSION

The Jaybird Canyon Watershed has an NSI value of 49, indicating a Moderate sensitivity to disturbance. The presence of significant areas of rock outcrop, soils classified as Hydrologic Soil Groups C and D, streamside management zones, and the possibility of rain-on-snow precipitation cause the watershed to be rated moderately susceptible to increased sediment delivery from erosion. The TOC for this watershed is 14-16 percent ERA.

The 1979 stream survey indicated that the stream channel was relatively stable, with higher stability in the lower section and lower stability in the upper section. The stream had a good riffle/pool ratio, but pool quality was poor. During the 1979 survey, no fish were found in the sampled reaches of the stream, undoubtedly because of the barriers to passage that are found near the mouth and throughout the lower section of the stream.

Ninety-five percent of the land-disturbing activities that were used in calculating the current level of percent ERA have occurred since the 1979 stream survey, so the stream and habitat conditions reported in 1979 may not be representative of conditions in 1994. In addition, the effects of 1986 flood have not been evaluated, although no evident effects are seen on aerial photos made in July 1991.

In the aerial photos, five clearcut areas can be seen in close proximity to the stream channel, all located on the south side of the canyon in the upper stream section. Timber-related activities appear to have occurred within the streamside management zone (SMZ) in the upper, ephemeral sections of the stream system. Because of the distance of these activities from perennial streams, it is assumed that this activity has had minimal effect on downstream channel conditions.

Records indicate that the entire length of Jaybird Canyon Creek is included in the 640-acre Big Hill grazing allotment, and the 42 acres that are riparian land are included in the calculation of the ERA for grazing. Transitory range use is not included in the ERA model, because clearcuts are already accounted for as timber harvest acres (Carlson and Christiansen 1993, Appendix D).

The current land disturbance value of 8.3 percent ERA, reflecting activities within the watershed since 1960, is about 59 percent of the lower end of the TOC range. When the TOC value is compared to the current level of land disturbance, the assessment of the probable adverse CWE results in a Moderate Risk rating.

Since several areas on the canyon slopes and adjacent to the stream channel have been clearcut and received site preparation since the stream survey was conducted in 1979, specific information on the recent effects, if any, of these land disturbances on the aquatic ecosystem and channel characteristics of Jaybird Canyon Creek is not known. In short, the quality of information available to make a CWE risk evaluation is poor, and therefore the CWE risk is rated Unknown.

#### CONCLUSIONS AND RECOMMENDATIONS

The CWE/ERA model, which uses land disturbance in the last 30 years to evaluate the risk of potential adverse cumulative effects within the watershed, indicates a moderate risk. Because much of the land management activity within the watershed has occurred since the 1979 stream survey, and the effects of this activity on the stream channel, if any, cannot be evaluated from the data available, the susceptibility of the watershed for adverse CWE is rated as Unknown. The soil types and geomorphic conditions give the watershed a natural moderate sensitivity to land-disturbing activities.

The ERA model is an important management tool, but its results must be viewed in conjunction with what is observed on the ground and what is seen on maps and aerial photographs. Watershed condition must be measured in terms of both physical and biological parameters to assess the impacts of management activities, especially when they occur in sensitive areas. Current information is essential to ensure accurate assessment of these impacts when determining the risk of adverse cumulative watershed effects.

Without the protection of sensitive soil areas and careful review of land management activities, the condition of the streams and aquatic ecosystems in a watershed can deteriorate quickly. The following recommendations are made to assist the Forest Service in minimizing the potential for adverse CWE within the Jaybird Canyon Watershed:

1. Evaluate the condition of the riparian zone and clearcut areas on canyon slopes to determine if there are impacts from grazing. Evaluate the effect, if any, of the clearcuts and road construction in the canyon.
2. Conduct an up-to-date comprehensive stream survey of Jaybird Canyon Creek, evaluating the physical condition of the stream. The Pfankuch channel condition survey technique and the Rosgen channel typing method should both be used to assess the sensitivity of the channel to watershed disturbances.
3. Conduct a Watershed Improvement Needs (WIN) inventory to identify any restoration needed.



## ROUND TENT

### ABSTRACT

An analysis of Cumulative Off-Site Watershed Effects (CWE) was conducted for the Round Tent Canyon Watershed to assess the potential risk of adverse CWE. The Round Tent Canyon Watershed, located in the Pacific Ranger District approximately 16 miles northeast of the city of Placerville, California, encompasses approximately 2,400 acres (3.8 square miles), 181 acres of which are privately owned. Beneficial downstream water uses include municipal and domestic water supplies, irrigation, recreation, cold freshwater habitat, coldwater spawning habitat, and wildlife habitat.

The major aquatic feature of the watershed is Round Tent Canyon Creek, a second order cold-water perennial tributary of Silver Creek. Round Tent Canyon Watershed includes approximately 5.8 miles of Class III streams. A stream survey of Round Tent Canyon Creek conducted by the Forest Service in 1979 indicated that the aquatic habitat and channel geomorphology were in fair condition. These conditions were reported to be less favorable in the upper portions of the creek.

The watershed has a High Natural Sensitivity Index (NSI 61), corresponding to a Threshold of Concern (TOC) of 12-14 percent Equivalent Roaded Acres (ERA). The current level of land disturbance, based on records dating from 1953, is 7.3 percent ERA. Comparison of this mathematically derived ERA value suggests a Moderate Risk rating for adverse Cumulative Watershed Effects (CWE). However, a number of land-disturbing activities have occurred since the 1979 stream survey, so the quality of information is poor, and the risk of occurrence of adverse CWE is rated Unknown.

It recommended that a comprehensive stream survey be conducted to assess the effects of the watershed disturbances that have taken place since the 1979 survey.

### DISCUSSION

The Round Tent Canyon watershed has an NSI value of 61, indicating that the watershed has a High sensitivity to disturbance. The presence of significant areas of rock outcrop, soils classified as Hydrologic Soil Groups C and D, inner gorge areas, and soils having very high erosion hazard (EHR), along with the possibility of rain-on-snow, cause the watershed to be susceptible to increased sediment delivery from erosion. The TOC for this watershed is 12-14 percent ERA.

The 1979 stream survey indicated that the stream channel was relatively stable, with the highest stability in the lower section and the lowest stability in the upper section. The survey noted only moderate stability of the canyon walls, because of their steepness and loose composition, and determined that these areas would be susceptible to damage by logging and grazing. Since the 1979 stream survey, a large number of land-disturbing activities, both timber harvesting and site preparation, have occurred in the watershed.

A naturally reproducing population of rainbow trout, a native California species, occurs in this watershed, but were only seen in the lower and middle sections of the stream. This could in part be explained by the numerous fish barriers noted in the lower and middle section in the form of waterfalls of up to 10 ft, and the fact the stream was intermittent in the upper section. Also, the best habitat was noted in the lower section, and the poorest in the upper section. Pools, which are usually preferred trout habitat, were abundant in the lower and middle sections, but few were seen in the upper section. Trout were rated as common in the lower section of the stream, which is good considering the low abundance of aquatic food, the high instance of bedrock substrate, and the small size of the watershed.

Based on interpretation of the aerial photos taken in July 1991, it appears that one of the wildfires occurred in an area of the canyon between the north and south forks of Road 11N64.4, burning out the riparian vegetation in what would be an SMZ. Regrowth of the vegetation in the burned area is sparse, but there appears to be no residual adverse affect on the stream channel. Four clearcut areas can be seen in the aerial photos in close proximity to the stream channel, all of which are located on the south side of the canyon in the upper stream section. Timber does not appear to have been harvested within the SMZ in these areas.

Records indicate that the entire length of Round Tent Canyon Creek is included in the 640-acre Big Hill grazing allotment. Thirty-two acres of riparian land are included in the calculation of the ERA for grazing and the effects of transitory grazing in clear cuts are accounted for in the ERA factor for clear cut harvesting (Carlson & Christiansen 1993).

The current land disturbance value of 7.3 percent ERA, reflecting activities within the watershed since 1953, is greater than 50 percent of the lower end of the TOC range. When the TOC number is compared to the current level of land disturbance, the assessment of the probable adverse CWE results in Moderate Risk.

Since several areas on the canyon slopes and adjacent to the stream channel have been clearcut and the object of site preparation since the stream survey was conducted in 1979, specific information on the recent effects, if any, of these land disturbances on the aquatic ecosystem and channel characteristics of Round Tent Canyon Creek is not available. In short, the quality of information available to make a CWE risk evaluation is poor, and therefore the CWE risk is rated Unknown.

#### CONCLUSIONS AND RECOMMENDATIONS

Because a moderate amount of management activity has occurred within the watershed since the 1979 stream survey, and the effects of this activity on the stream channel, if any, cannot be evaluated from the data available, the CWE susceptibility of the watershed is rated Unknown. The soil types and geomorphic conditions give the watershed a naturally high sensitivity to land-disturbing activities.



The ERA/TOC comparison model is an important management tool, but its results must be viewed in conjunction with what is observed on the ground and what is seen on maps and aerial photographs. Watershed condition must be measured in terms of both physical and biological parameters to assess the impacts of management activities, especially when they occur in sensitive areas. Current information is essential to ensure accurate assessment of these impacts in evaluating the risk of adverse cumulative watershed effects.

Without the protection of sensitive soil areas and careful review of land management activities, the condition of a stream system and its aquatic ecosystem can deteriorate quickly. The following recommendations are made to assist the Forest Service in minimizing adverse CWE within the Round Tent Canyon Watershed:

1. Manage sensitive areas with the primary objective of maintaining or improving soil productivity, slope stability, and water quality. In the Round Tent Canyon Watershed, this would include retaining adequate ground cover on steep and/or highly erosive soils, immediate reforestation of clearcut areas, and maintaining healthy riparian stands along the stream channel.
2. Conduct an up-to-date comprehensive stream survey of Round Tent Canyon Creek, evaluating both biological and physical conditions in the stream. The Pfankuch channel condition survey technique and the Rosgen channel typing method should both be used to assess the sensitivity of the channel to watershed disturbances.
3. Evaluate the condition of the riparian zone and clearcut areas on canyon slopes to determine if there are impacts from grazing. Evaluate the effect, if any, of the clearcuts in the canyon, and the apparent wildfire within the SMZ. Conduct a WIN inventory to identify any restoration needed.

## **LOWER SILVER**

### **ABSTRACT**

An analysis of Cumulative Off-Site Watershed Effects (CWE) was conducted for the Lower Silver Creek Watershed to assess the potential risk of adverse CWE. The Lower Silver Creek Watershed is located along the boundary of the Pacific and the Georgetown Ranger Districts, the lowermost border being approximately 2.5 miles northeast of the city of Pollock Pines, California. The watershed encompasses approximately 4,188 acres (6.5 square miles); of these, 3,802 are owned by the USDA Forest Service and 386 are privately owned. Beneficial downstream water uses include municipal and domestic water supplies, recreational uses, cold freshwater habitat, cold-water spawning habitat, and wildlife habitat. There is a diversion dam (Camino Reservoir) located above the watershed on Silver Creek.



The major aquatic feature of the watershed is Silver Creek, a fourth order tributary of the South Fork of the American River. There are approximately 6.7 miles of Class I and 8.5 miles of Class II streams in the watershed. A 1980 stream survey of lower Silver Creek indicated that aquatic habitat was in fair to poor condition.

The watershed has been determined to have a Very High Natural Sensitivity Index (NSI 283), corresponding to a Threshold of Concern (TOC) of 10-12 percent Equivalent Roaded Acres (ERA). The current level of land disturbance, based on disturbance records collected since 1960, is 6.7 percent ERA. Comparison of this mathematically determined ERA value with the watershed's TOC suggests a Moderate Risk for adverse Cumulative Watershed Effects (CWE). However, the poor quality of stream channel information available for this evaluation results in a rating of Unknown Risk.

It is recommended that a comprehensive stream survey be conducted to assess the CWE of watershed disturbance that has occurred since the 1980 stream survey.

### DISCUSSION

The Lower Silver Creek Watershed has an NSI value of 283, indicating that the watershed has a Very High rating for sensitivity to disturbance. The presence of significant areas of inner gorge, soils classified as Hydrologic Soil Groups C and D, and soils having very high erosion hazard (EHR) cause the watershed to be very susceptible to increased sediment delivery from erosion. The TOC for this watershed is 10-12 percent ERA.

The 1980 stream survey noted that the stream bed consisted of high percentages of bedrock, which often makes poor trout habitat. Canopy cover, which is needed to keep stream waters cool, was rated as fair in the surveyed section of the stream. Trout need clean, unarmored gravel with a good flow of cold water to spawn. Gravel and fine substrate materials for trout spawning habitat in Lower Silver Creek are probably a limiting factor. Riffles for invertebrate production for food are also probably a factor limiting trout production. Pools are a favored habitat for trout, and were noted as abundant in the surveyed reach, but fish cover within them was rated as fair to poor. The fact that only 10 trout were seen in the 0.5 mile survey, with no juveniles noted, indicated that the natural production of fish and invertebrates in Lower Silver Creek is limited. This survey included only a 0.5-mile stretch of river out of a total of 13.5 miles of Class II streams in the watershed, and it is recommended that other sections of this watershed be sampled.

Interpretation of aerial photographs made in 1991 suggest the following:

- The borrow pit access road may be actively contributing sediment to Silver Creek; there appears to be stream aggradation in the portion of the creek adjacent to the access road. However, this aggradation may be a result of a combination of factors, such as sediment from the access road, land

disturbance, and reduced stream flows due to the presence of Camino Reservoir.

- The timber harvesting has been done in the upper portions of the watershed, away from the Class II and III streams, and does not appear to have had a direct effect on those streams. There appears to be some gulying in harvested and burned areas, possibly associated with Class IV streams, which would contribute sediment to the Class II and III streams.
- It appears that timber has been harvested and roads have been built in some of the drainage bottoms on the private land.

The current land disturbance ERA value of 6.7 percent, reflecting activities within the watershed since 1954 (Table 3C, Appendix B), is between 0.5 and 0.8 of the lower end of the TOC range. When the TOC number is compared to the current level of land disturbance, the assessment of the probable adverse CWE results in a rating of Moderate Risk. However, almost two-thirds of the land disturbance used in the ERA calculation during the last 40 years has occurred since the stream survey of 1980. The effects of this land disturbance, if any, in terms of adverse cumulative watershed effects on the stream system have not been examined in field surveys of the channel and cannot be adequately evaluated. Therefore, the risk rating for CWE is Unknown.

## **SUNSET**

### **ABSTRACT**

An analysis of Cumulative Off-Site Watershed Effects (CWE) was conducted for the Sunset Watershed to assess the potential risk of adverse CWE. The Sunset Watershed is located in the Georgetown and Pacific Ranger Districts, approximately 20 miles northeast of the city of Placerville, California. The watershed encompasses approximately 10,679 acres (16.7 square miles), 5,408 acres of which are privately owned. Beneficial downstream water uses include municipal and domestic water supplies, irrigation, recreation, cold freshwater habitat, cold-water spawning habitat, and wildlife habitat. The watershed has been developed for hydroelectric power generation.

The major aquatic feature of the watershed is Silver Creek, a fifth order cold-water perennial tributary of the South Fork of the American River. The Sunset Watershed includes approximately 9.3 miles of Class I streams, and 31.2 miles of Class III streams. A stream survey of a 0.5-mile section of Silver Creek downstream of the Sunset Watershed, conducted by the Forest Service in 1980, did not rate channel stability, but did cite an abundance of bedrock-pools and only traces of gravels or fines. This indicates excellent channel stability. Canopy cover was reported as fair, and riffle areas for potential invertebrate production were reported to be almost nonexistent. Consequently, populations of fish in this area are expected to be low or absent.



Sugar Pine Creek is the other major aquatic feature of the watershed. Sugar Pine Creek is a third order cold-water perennial tributary to Silver Creek that drains the western portion of the Sunset Watershed, entering Silver Creek just upstream of Camino Reservoir. A 1976 survey of Sugar Pine Creek reported moderate channel stability, abundant riffles with a relatively low fines component to the substrate, and moderate to heavy canopy cover. This typically indicates good habitat for fish populations.

The watershed has a Very High Natural Sensitivity Index (NSI 91), corresponding to a Threshold of Concern (TOC) of 10-12 percent Equivalent Roaded Acres (ERA). The current level of land disturbance, based on records dating from 1960, is 7.7 percent ERA. Comparison of this mathematically derived ERA value suggests a Moderate Risk rating for adverse Cumulative Watershed Effects (CWE). However, about three-fourths of the land-disturbing activities have occurred since the 1976 stream survey of Sugar Pine Creek, and there are no surveys of Silver Creek within the watershed, so the quality of information is poor, and the risk of occurrence of adverse CWE is rated Unknown.

It is recommended that a comprehensive stream survey be conducted to assess the effects of the watershed disturbances that have taken place.

#### DISCUSSION

The Sunset Watershed has an NSI value of 91, indicating that it has a Very High sensitivity to disturbance. The presence of significant inner gorge areas, soils classified as Hydrologic Soil Groups C and D, rock outcrop areas, soils having very high erosion hazard (EHR), and the possibility of rain-on-snow precipitation cause the watershed to be very susceptible to increased sediment delivery from erosion. The TOC for this watershed is 10-12 percent ERA.

There are no stream surveys of Silver Creek within the Sunset Watershed area, and the 1976 survey of Sugar Pine Creek was conducted before any significant timber harvest or other recorded land disturbance occurred. No surveys of the streams have been conducted since the Cleveland fire in 1992. No other data on channel conditions in Silver Creek within the watershed are available.

The 1980 stream survey of lower Silver Creek downstream of the Sunset Watershed and Camino Reservoir noted that salmonid fish reproduction was limited by a lack of suitable spawning gravels, although naturally reproducing trout populations and non-salmonid native fish were present in the Silver Creek drainage. There are no population estimates, age structure data, or other quantitative information on fish in the Sunset Watershed.

Review of 1991 aerial photographs of the watershed confirms that there has been considerable land-disturbing activity in the recent past. Harvest methods and prescriptions are evident, contributing to soil instability and other watershed effects.

The 1992 Cleveland fire affected the southeast corner of the watershed. Three intermittent tributaries drain the affected area, and the fire may have burned out riparian



vegetation within the SMZs. No surveys of channel changes resulting from the fire have been conducted, and lack of aerial photos of the area since the fire prevent any more detailed assessment of potential effects.

Records indicate that all of the grazing allotments in the Sunset Watershed include riparian areas. Recent clearcuts of portions of the watershed may be providing transitory range for grazing, as may the areas affected by the Cleveland fire. Livestock grazing effects on CWE are accounted for in the ERA model, however, there have been no on- the- ground evaluations relating to the effects of grazing.

The current land disturbance value of 7.7 percent ERA, reflecting activities within the watershed since 1960, is equal to 77 percent of the lower end of the TOC range for this highly sensitive watershed. When the TOC number is compared to the current level of land disturbance, the assessment of the probable adverse CWE falls at the high end of the Moderate Risk range.

Since there are no stream surveys of Silver Creek within the watershed, and since nearly all recorded timber harvest and land disturbance has occurred since the survey on Sugar Pine Creek, specific information on the recent effects, if any, of land disturbances on the aquatic ecosystem and channel characteristics of the watershed are not available. In short, the quality of information available to make a CWE risk evaluation is poor or non-existent, and therefore the CWE risk is rated Unknown.

#### CONCLUSIONS AND RECOMMENDATIONS

Because nearly all management activity has occurred within the watershed since the Sugar Pine Creek stream survey in 1976 and without a local Silver Creek stream survey, the effects of this activity on the stream channel, if any, cannot be evaluated from the data available, and the CWE susceptibility of the watershed is rated as Unknown. The soil types and geomorphic conditions give the watershed a naturally Very high sensitivity to land-disturbing activities.

The ERA/TOC comparison model is an important management tool, but its results must be viewed in conjunction with what is observed on the ground and what is seen on maps and aerial photographs. Watershed condition must be measured in terms of both physical and biological parameters to assess the impacts of management activities, especially when they occur in sensitive areas. Current information is essential to ensure accurate assessment of these impacts when determining the risk of adverse cumulative adverse watershed effects.

Without the protection of sensitive soil areas and careful review of land management activities, the condition of an aquatic ecosystem can quickly deteriorate. The following recommendations are made to assist the Forest Service in minimizing adverse CWE within the Sunset Watershed:

1. Manage sensitive areas with the primary objective of maintaining or improving soil productivity, slope stability, and water quality. In the Sunset Watershed, this would include retaining adequate ground cover on steep and/or highly erosive soils, immediate reforestation of clearcut areas, and maintaining healthy riparian stands along the stream channel.
2. Conduct an up-to-date comprehensive stream survey of Sugar Pine Creek and Silver Creek within the watershed boundary, evaluating both the biological and physical conditions of the stream. The Pfankuch channel condition survey technique and the Rosgen channel typing method should both be used to assess the sensitivity of the channel to watershed disturbances.
3. Evaluate the condition of the riparian zone within the Cleveland fire area to determine the potential for accelerated erosion and siltation of the streams. Conduct a WIN inventory to identify any restoration needed.
4. Roads within the inner gorge areas should be evaluated for potential erosion control measures. Effects of livestock grazing in riparian areas and clear-cuts should be evaluated.

### **WATERSHED IMPROVEMENT NEEDS**

As a result of the CWE analysis, the following watershed improvement needs (WIN) have been identified for the Whale Rock project area. Each action alternative will incorporate some slight differences in the number of roads that are rocked, number of landings obliterated, and miles of system roads and skid roads obliterated. All identified watershed improvement needs that are located within the Whale Rock project area have at least some portion included in each of the Action Alternatives. Road stabilization work varies by alternative depending on roads to be used in conjunction with the project. Table G-1 reflects the maximum number of WIN projects (which would be included with Alternative B).

A number of watershed improvement projects are currently underway or have recently occurred. Rehabilitation Plans have been developed for Soldier Creek Watershed (Farley 1995) and for Riverton Watershed (Boyd 1995) which address areas of known erosion or sedimentation in order to decrease the potential for adverse CWE in these two watersheds, which are presently considered to be over threshold. Additional watershed improvement needs have been identified in Lower Silver, Jaybird, and Round Tent Watersheds. Projects in Soldier Creek include obliteration of abandoned roads and landings (roughly 2.8 acres), improving road drainage including stabilizing stream crossings (3.0 acres), the repair of a water hole and the clearing of large woody debris jams (0.9 acres). Roughly 5 acres of the projects are on USFS lands and roughly 2.5 acres of additional restoration work are also identified on private lands.

<b>Table G -1: Summary of Watershed Improvement Needs for Whale Rock</b> (miles of road rocking varies by alternative)	
<b>Watershed</b>	<b>Watershed Improvement Need</b>
<b>Jaybird</b>	2.8 miles of road rocking (0.3 miles) <sup>1</sup> Obliteration of 11 landings Obliteration of 2 miles of skid roads
<b>Pacific House</b>	2.3 miles of road rocking Obliteration of 9 landings Obliteration of 1 mile of skid road
<b>Riverton</b>	1.3 miles of road rocking Obliteration of 0.5 miles road Obliteration of 15 landings Obliteration of 3 miles of skid roads
<b>Round Tent</b>	4.75 miles of road rocking Obliteration of 14 landings Obliteration of 1 mile of skid road Obliteration of 0.33 miles of road (11N64A)
<b>Lower Silver</b>	Obliteration of 4 landings Obliteration of 1 mile of skid road
<b>Soldier Creek</b>	6.8 miles of road rocking (1.2 miles) Log jam removal (0.9 acres) Obliteration of 15 landings Obliteration of 3 miles of skid road Waterhole stabilization
<b>Sunset</b>	1.3 miles of road rocking (0.3 miles) Obliteration of 12 landings Obliteration of 1 mile of skid road

<sup>1</sup>Mileage in parentheses are miles of road rocking scheduled to improve haul. This rocking will also improve the watershed condition and the miles are included in the total miles of road rocking displayed in Table G-1.

In 1994 and 1995, a number of different field reviews were conducted within Soldier Creek Watershed. These reviews primarily focused on the presence of an old, abandoned road on National Forest lands that was contributing to channel instability and siltation problems in the South and North Forks of Soldier Creek. As a result, funds collected on the Black Flag Salvage Timber Sale will be used to reshape and stabilize portions of the channel.



In Riverton Watershed the majority of the projects identified in the rehabilitation plan fall outside of the Whale Rock project area, within the Cleveland Fire Area. Projects within the Whale Rock Area include road and stream crossing stabilization work in several locations as well as obliteration of 15 existing landings and 3 miles of existing skid roads (roughly 8 acres). All of these projects are on USFS lands. See the rehabilitation plan for a further discussion of projects and associated jurisdictions outside of the Whale Rock Project Area. As called for in the Cleveland Fire EIS, post-harvest ripping of selected landings and roads within the Riverton Watershed occurred in 1994.

Within the Lower Silver Creek Watershed, WIN projects include obliteration of four landings as well as obliteration of 1 mile of skid road (roughly 2.3 acres). In Jaybird Watershed projects include obliteration of eleven landings within an SMZ (streamside management zone) as well as obliteration of 2 miles of skid road and 0.33 miles of system road (roughly 6.1 acres). In Round Tent Watershed projects include obliteration of fourteen landings as well as obliteration of 1 mile of skid road (roughly 5.6 acres). In Pacific House Watershed projects include obliteration of nine landings within an SMZ (streamside management zone) as well as obliteration of 1 mile of skid road (roughly 4 acres). In Sunset Watershed projects include obliteration of twelve landings as well as obliteration of 1 mile of skid road (roughly 5 acres).

### PROPOSED ACTIVITIES

The following tables identify the location of the dominant activities that would occur in each watershed by the corresponding alternative. These activities are broken down by prescribed burning, machine piling, constructed fuelbreaks, natural stands harvested and plantations harvested.

<b>Table G-2: Prescribed Burning</b>								
<b>PRESCRIBED BURNING</b>	<b>ACRES TREATED BY WATERSHED</b>							
Alternative	Pacific House	Soldier Creek	Riverton	Lower Silver	Round Tent	Sunset	Jaybird	Total
A	0	0	0	0	0	0	0	0
B	422	944	804	172	1348	784	806	5280
C	463	856	920	172	1107	809	844	5161
D	202	200	259	92	337	156	279	1525
E	298	771	388	145	850	533	748	3733

**Table G-3: Machine Piling**

<b>MACHINE PILING</b>	<b>ACRES TREATED BY WATERSHED</b>							
Alternative	Pacific House	Soldier Creek	Riverton	Lower Silver	Round Tent	Sunset	Jaybird	Total
A	0	0	0	0	0	0	0	0
B	78	201	92	31	286	117	220	1024
C	5	21	2	31	98	105	200	462
D	10	39	0	11	74	33	73	240
E	40	163	23	29	190	123	199	777

**Table G-4: Fuelbreaks Constructed**

<b>FUELBREAK CONSTRUCT.</b>	<b>ACRES TREATED BY WATERSHED</b>							
Alternative	Pacific House	Soldier Creek	Riverton	Lower Silver	Round Tent	Sunset	Jaybird	Total
A	0	0	0	0	0	0	0	0
B	25	208	21	0	285	114	261	914
C	0	0	0	0	0	0	0	0
D	0	0	0	0	0	0	0	0
E	25	208	21	0	285	114	261	914

**Table G-5: Plantations Harvested**

<b>PLANTATIONS HARVESTED</b>	<b>ACRES TREATED BY WATERSHED</b>							
Alternative	Pacific House	Soldier Creek	Riverton	Lower Silver	Round Tent	Sunset	Jaybird	Total
A	0	0	0	0	0	0	0	0
B	156	55	213	42	15	43	38	562
C	156	55	213	42	15	43	38	562
D	156	55	213	42	15	43	38	562
E	156	55	213	42	15	43	38	562

<b>Table G-6: Natural Stands Harvested</b>								
<b>NATURAL STANDS HARVESTED<sup>1</sup></b>	<b>ACRES TREATED BY WATERSHED</b>							
<b>Alternative<sup>2</sup></b>	<b>Pacific House</b>	<b>Soldier Creek</b>	<b>Riverton</b>	<b>Lower Silver</b>	<b>Round Tent</b>	<b>Sunset</b>	<b>Jaybird</b>	<b>Total</b>
A	0	0	0	0	0	0	0	0
B	289	594	347	123	856	355	617	3181
C	19	84	30	123	391	537	802	1956
D	40	157	0	44	298	131	292	962
E	135	445	74	115	477	379	578	2203

<sup>1</sup>Does not include fuelbreak acreage which was displayed in earlier Table.

<sup>2</sup>Difference between Alternative B and between Alternatives C is a reflection of Protected Activity acreage that is harvested under Alternative C.

#### **ADDITIONAL INFORMATION FOR EACH WATERSHED BY ALTERNATIVE**

The following tables display additional information concerning activities within each watershed by alternative. Cumulative effects tables are included here so the effects of the activities can be easily contrasted by alternative.

#### **ALTERNATIVE A**

<b>Table G-7: Alternative A Potential Cumulative Watershed Effects Resulting from a 1997 Catastrophic Wildfire in the Whale Rock Project Area</b>						
<b>Watershed</b>	<b>Established TOC (%)</b>	<b>%ERA - Present/Projected</b>				
		<b>1995 (present)</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2003</b>
Jaybird	14-16	8.2	7.8	22.1	18.7	14.2
Pacific House	10-12	5.1	4.9	10.6	9.2	7.4
Riverton	10-12	12.9	12.7	11.8	11.1	9.5
Round Tent	12-14	7.3	20.6	17.3	15.3	11.8
Lower Silver	10-12	7.0	7.2	15.1	13.2	10.6
Soldier Creek	12-14	12.4	11.3	25.4	21.9	17.0
Sunset	10-12	8.7	11.9	10.8	10.0	8.6



<b>Table G-8: Alternative A Cumulative Watershed Effects in the Absence of Catastrophic Fire</b>						
<b>Watershed</b>	<b>Established TOC (%)</b>	<b>%ERA - Present/Projected</b>				<b>2003</b>
		<b>1995 (present)</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	
Jaybird	14-16	8.2	7.8	7.7	7.6	7.4
Pacific House	10-12	5.1	4.9	4.9	4.8	4.7
Riverton	10-12	12.9	10.3	11.1	9.6	8.6
Round Tent	12-14	7.3	6.5	6.4	6.3	6.0
Lower Silver	10-12	7.0	6.5	7.0	6.8	6.6
Soldier Creek	12-14	12.4	11.3	11.0	10.8	10.2
Sunset	10-12	8.7	8.3	8.0	7.7	7.1

**ALTERNATIVE B**

<b>Table G-9: Alternative B Activities, Part 1</b>					
<b>Watershed</b>	<b>Total Watershed Acres</b>	<b>Harvest Acres</b>	<b>Percent of Watershed to Harvest</b>	<b>Rx Burn Acres</b>	<b>Percent of Watershed to Rx Burn</b>
Jaybird	1652	916	55%	806	49%
Pacific House	8344	470	6%	422	5%
Riverton	10959	581	5%	804	7%
Round Tent	2439	1156	47%	1348	55%
Lower Silver	4188	165	4%	172	4%
Soldier	3491	857	25%	944	27%
Sunset	10679	512	5%	784	7%

**Table G-10: Alternative B Activities, Part 2**

Treatment/ Watershed	Machine Piling	Harvest acres in Fuel Breaks	New Roads (mi)	Road Rock <sup>1</sup> (mi)	Compaction Remediation (acres)
Jaybird	220	261	0.20	2.50	5.63
Pacific House	78	25	0.43	2.30	4.00
Riverton	92	21	0.00	1.30	7.90
Round Tent	286	285	0.88	4.75	6.10
Lower Silver	31	0	0.16	0.00	5.00
Soldier	201	208	0.00	5.60	7.90
Sunset	117	114	0.00	1.00	5.00

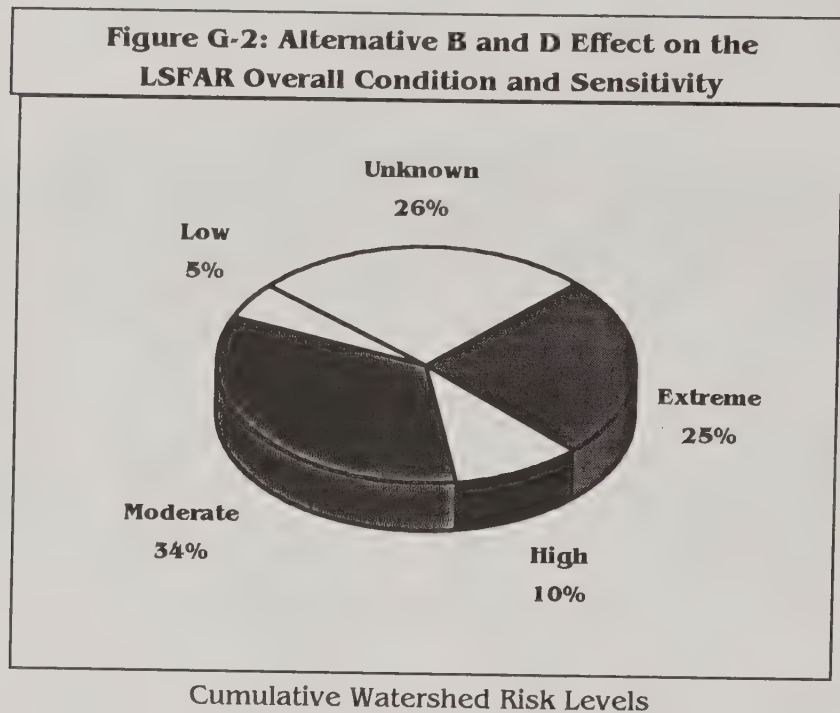
<sup>1</sup>Road rocking scheduled specifically for watershed improvement needs only.

**Table G-11: Alternative B Cumulative Watershed Effects**

Watershed	Established TOC(%)	%ERA - Present/Projected						
		1995 (present)	1998	1999	2000	2001	2002	2003
Jaybird	14-16	8.2	7.9	11.9	15.7	18.1	15.2	14.7
Pacific House	10-12	5.1	4.9	5.0	5.5	5.6	5.5	5.4
Riverton	10-12	12.9	10.4	10.3	9.8	9.6	9.3	8.9
Round Tent	12-14	7.3	7.6	12.8	13.0	13.1	14.2	13.4
Lower Silver	10-12	7.0	6.6	6.9	6.9	6.9	6.7	6.7
Soldier Creek	12-14	12.4	11.3	13.1	13.9	14.2	14.4	14.1
Sunset	10-12	8.7	8.8	8.6	8.8	8.1	7.9	7.4

### Lower South Fork American River Basin

The 179,703 acre lower section (LSFAR) includes the seven watersheds that encompass the Whale Rock Analysis Area. Table G-12 displayed a summary of the CWE results with implementation of Alternatives B. Refer to Figure G-1 for comparison with existing condition of the Lower South Fork American River.



Comparison of Figure G-1 (Existing Condition) and the above Figure illustrates that implementation of Alternatives B and D would result in a 2% increase of the basin area that is considered to be at extreme risk for adverse CWE and a 1% increase in the basin area that is considered to be at a high risk for adverse CWE. This shift would also result in a 3% reduction of the total basin area for watersheds presently considered to be at a moderate risk of adverse CWE.

### ALTERNATIVE C

**Table G-12: Alternative C Activities, Part 1**

Watershed	Total Watershed Acres	Harvest Acres	Percent of Watershed to Harvest	Rx Burn Acres	Percent of Watershed to Rx Burn
Jaybird	1652	840	51%	844	51%
Pacific House	8344	175	2%	463	6%
Riverton	10959	<b>520</b>	5%	<b>920</b>	8%
Round Tent	2439	406	17%	1107	45%
Lower Silver	4188	165	4%	172	4%
Soldier	3491	<b>139</b>	<b>34%</b>	<b>856</b>	<b>25%</b>
Sunset	10679	<b>580</b>	<b>4%</b>	<b>809</b>	<b>8%</b>

Bold indicates a change from Alternative B



**Table G-13: Alternative C Activities, Part 2**

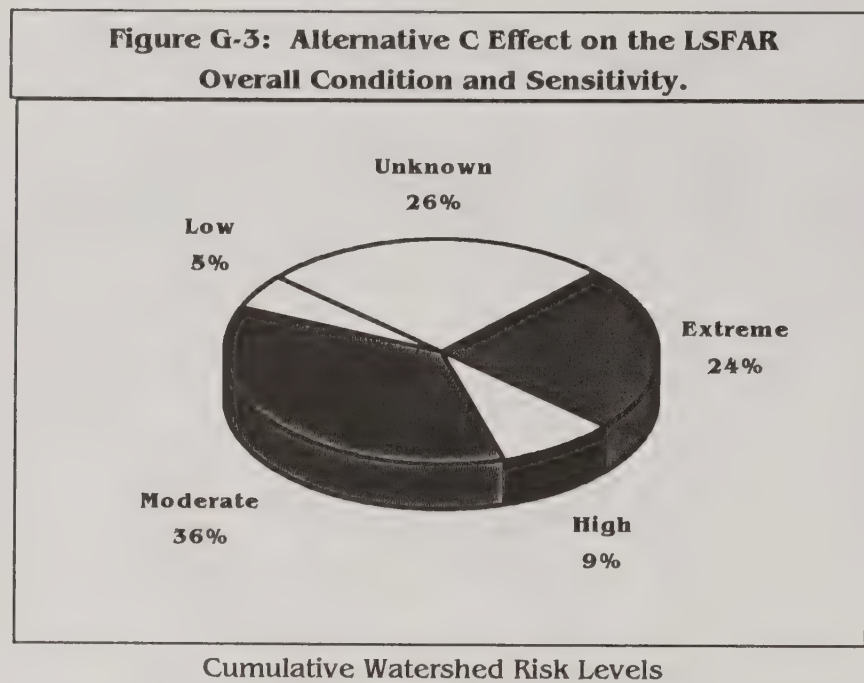
Treatment/ Watershed	Prescribed Burning	Total Harvest	New Roads (mi)	Road Rock <sup>1</sup> (mi)	Compaction Remediation (acres)
Jaybird	844 (+38)	840 (-76)	0.20	2.80 (+0.3)	5.63
Pacific House	463 (41)	175 (-295)	0.43	2.30	4.00
Riverton	920 (116)	220 (-361)	0.00	0.50 (-0.8)	7.90
Round Tent	1107 (-241)	406 (-750)	0.27 (-.61)	1.20 (-3.55)	6.10
Lower Silver	172	165	0.16	0.00	5.00
Soldier	956 (-88)	139 (-718)	0.00	0.80 (-4.8)	7.90
Sunset	809 (25)	462 (-50)	0.16	1.00	5.00

Values in parentheses indicate changes from Alternative B.

<sup>1</sup>Road rocking scheduled specifically for watershed improvement needs only.

**Table G-14: Alternative C Cumulative Watershed Effects**

Watershed	Established TOC(%)	%ERA - Present/Projected						
		1995 present)	1998	1999	2000	2001	2002	2003
Jaybird	14-16	8.2	7.9	11.6	15.0	17.6	14.6	14.1
Pacific House	10-12	5.1	4.9	4.8	5.1	5.0	5.0	4.9
Riverton	10-12	12.9	10.4	9.9	9.7	9.3	9.1	8.9
Round Tent	12-14	7.3	6.8	8.6	8.5	8.5	9.6	9.1
Lower Silver	10-12	7.0	6.6	7.0	6.9	6.9	6.7	6.7
Soldier Creek	12-14	12.4	11.3	11.3	11.3	11.1	11.4	11.3
Sunset	10-12	8.7	9.0	8.8	8.0	7.7	7.5	7.7



Comparison of Figure G-1 (Existing Condition) and the above Figure illustrates that implementation of Alternative C would result in a 1% increase of the basin area that is considered to be at a high risk for adverse CWE. This shift would also result in a 1% reduction of the total basin area for watersheds presently considered to be at a moderate risk of adverse CWE.

#### ALTERNATIVE D

<b>Table G-15: Alternative D Activities, Part 1</b>					
<b>Watershed</b>	<b>Total Watershed Acres</b>	<b>Harvest Acres</b>	<b>Percent of Watershed to Harvest</b>	<b>Rx Burn Acres</b>	<b>Percent of Watershed to Rx Burn</b>
Jaybird	1652	330	20%	279	17%
Pacific House	8344	196	2%	202	2%
Riverton	10959	213	2%	259	2%
Round Tent	2439	313	13%	337	14%
Lower Silver	4188	86	2%	92	2%
Soldier	3491	212	6%	200	6%
Sunset	10679	174	2%	156	1%

Bold values indicate a change from Alternative B

<b>Table G-16: Alternative D Activities, Part 2</b>					
Treatment/ Watershed	Prescribed Burning	Total Harvest	New Roads (mi)	Road Rock <sup>1</sup> (mi)	Compaction Remediation
Jaybird	279 (-527)	330 (-586)	0.20	2.50	5.63
Pacific House	202 (-220)	196 (-274)	0.43	0.30 (-2.00)	4.00
Riverton	259 (-545)	213 (-368)	0.00	0.50 (-0.8)	7.90
Round Tent	337 (-1011)	313 (-843)	0.75 (-0.13)	1.50 (-3.25)	6.10
Lower Silver	92 (-80)	86 (-79)	0.16	0.00	5.00
Soldier	200 (-744)	212 (-645)	0.37 (0.37)	0.80 (-4.8)	7.90
Sunset	156 (-628)	174 (-338)	0.16	0.00 (-1.00)	5.00

Values in parentheses indicate change from Alternative B.

<sup>1</sup>Road rocking scheduled specifically for watershed improvement needs only.

<b>Table G-17: Alternative D Cumulative Watershed Effects</b>								
Watershed	Established TOC(%)	%ERA - Present/Projected						
		1995 (present)	1998	1999	2000	2001	2002	2003
Jaybird	14-16	8.2	10.5	10.7	11.2	10.2	10.0	9.8
Pacific House	10-12	5.1	5.2	5.1	5.1	5.2	5.0	5.0
Riverton	10-12	12.9	10.6	10.1	9.7	9.4	8.9	8.6
Round Tent	12-14	7.3	6.8	8.6	8.5	8.5	9.6	9.1
Lower Silver	10-12	7.0	6.9	6.7	6.7	6.5	6.4	6.4
Soldier Creek	12-14	12.4	11.3	11.1	11.2	10.7	10.4	10.2
Sunset	10-12	8.7	8.5	8.3	8.7	8.2	7.9	7.3



**ALTERNATIVE E****Table G-18: Alternative E Activities, Part 1**

Watershed	Total Watershed Acres	Harvest Acres	Percent of Watershed to Harvest	Rx Burn Acres	Percent of Watershed to Rx Burn
Jaybird	1652	877	53%	748	45%
Pacific House	8344	316	4%	298	4%
Riverton	10959	234	2%	188	2%
Round Tent	2439	577	24%	850	35%
Lower Silver	4188	157	4%	145	3%
Soldier	3491	708	20%	771	22%
Sunset	10679	536	5%	533	5%

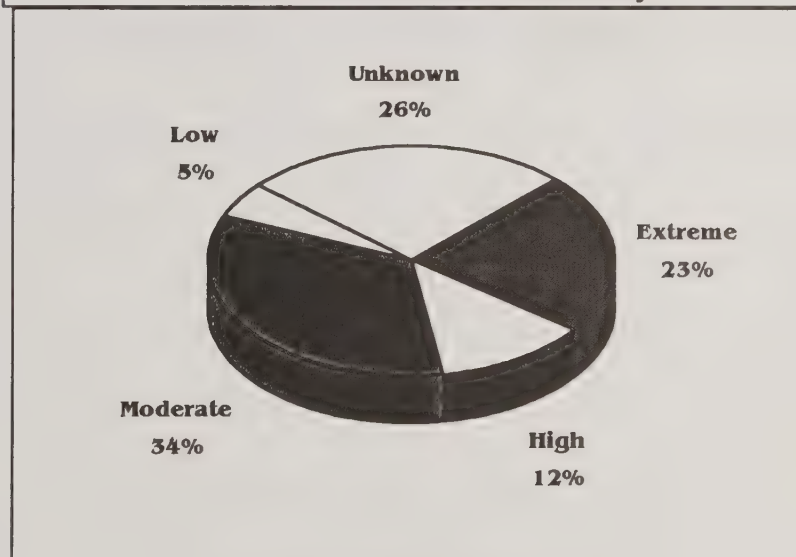
**Table G-19: Alternative E Activities, Part 2**

Treatment/ Watershed	Prescribed Burning	Total Harvest	New Roads (mi)	Road Rock <sup>1</sup> (mi)	Compaction Remediation (acres)
Jaybird	748 (-58)	877 (-39)	0.20	2.80 (+0.3)	5.63
Pacific House	298 (-124)	316 (-154)	0.43	2.30	4.00
Riverton	188 (-616)	234 (-347)	0.00	1.3	7.90
Round Tent	850 (-498)	577 (-579)	0.88	4.75	6.10
Lower Silver	145 (-27)	157 (-8)	0.16	0.00	5.00
Soldier	771 (-173)	708 (-149)	0.37 (0.37)	6.80 (+1.2)	7.90
Sunset	533 (-251)	536 (24)	0.16 (0.16)	1.3 (+0.3)	5.00

<sup>1</sup>Road rocking scheduled specifically for watershed improvement needs only.  
Values in parentheses indicate changes from Alternative B.

<b>Table G-20: Alternative E Cumulative Watershed Effects</b>								
Watershed	Established TOC(%)	%ERA - Present/Projected						
		1995 (present)	1998	1999	2000	2001	2002	2003
Jaybird	14-16	8.2	7.9	11.8	15.3	17.5	14.8	14.3
Pacific House	10-12	5.1	4.9	4.9	5.3	5.3	5.2	5.2
Riverton	10-12	12.9	10.4	10.0	9.8	9.4	9.1	8.7
Round Tent	12-14	7.3	7.2	10.7	10.8	10.8	11.5	10.9
Lower Silver	10-12	7.0	6.6	7.0	6.9	6.9	6.7	6.7
Soldier Creek	12-14	12.4	11.3	12.8	13.4	13.6	13.7	13.4
Sunset	10-12	8.7	9.0	8.8	10.0	9.5	9.0	7.7

**Figure G-4: Alternative E Effect on the LSFAR  
Overall Condition and Sensitivity**



Cumulative Watershed Risk Levels

Comparison of Figure G-1 (Existing Condition) and the above Figure illustrates that implementation of Alternatives G and H would result in a 3% increase of the basin area that is considered to be at a high risk for adverse CWE. This shift would also result in a 3% reduction of the total basin area for watersheds presently considered to be at a moderate risk of adverse CWE.

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## **APPENDIX H**

### **SUPPLEMENTAL ECONOMIC INFORMATION FOR THE PROPOSED WHALE ROCK PROJECT DRAFT ENVIRONMENTAL IMPACT STATEMENT**

ELDORADO NATIONAL FOREST

PACIFIC RANGER DISTRICT

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## APPENDIX H

### SUPPLEMENTAL ECONOMIC INFORMATION

This appendix displays the Present Net Value (PNV) and the Benefit/Cost (B/C) ratio of the various alternatives. The Forest Service measures economic efficiency in terms of PNV and B/C. Because many of the values and costs associated with this project would be realized from 0 to 15 years from now, both the future values and costs need to be discounted back to the present. For those specific costs and values that accrue over several years duration, the midpoint of the future period is used in the calculations. The specific costs and values used in the calculations are the predicted costs and receipts displayed in Table 26 in Chapter IV. The following time periods were used for discounting the 4% interest rate:

ACTIVITY	DISCOUNT PERIOD (YEARS)	
	Costs	Receipts
EIS Preparation	0	-
Preparation	2	-
Administration	3	-
Road Const/Recons	1	-
Burning	5	-
Slash-Machine Pile	3	-
Fuelbreak Maintenance	7	-
Receipts	-	3

The PNV and B/C ratio of the various alternatives, using a 4% interest rate, discounted to 1996 using the above indicated discount years and the total costs and receipts shown in Table 26 in Chapter IV are as follows:

ALTERNATIVE	PRESENT NET VALUE (PNV)	BENEFIT COST RATIO (B/C)
A	-\$144,000	0.00
B	\$1,663,454	1.56
C	\$542,142	1.25
D	\$206,122	1.19
E	\$1,530,670	1.59



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## **APPENDIX I**

### **SUMMARY OF THE EFFECTS OF THE COX CANYON TIMBER SALE**

ELDORADO NATIONAL FOREST

PACIFIC RANGER DISTRICT

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## APPENDIX I

### SUMMARY OF EFFECTS OF THE COX CANYON TIMBER SALE

#### California Spotted Owl

The California Spotted Owl: A Technical Assessment of Its Current Status (the CASPO Report) was made available for review in May 1991. In January 1993, the Regional Forester adopted the guidelines set forth in the CASPO Report for an interim period while longer term strategies could be analyzed. Recommendations for timber harvest and fuels management activities are provided in the CASPO Report and are summarized below. Also included with each recommendation is a discussion of how the recommendation relates to the remaining units in the Cox Canyon Timber Sale. Units that were burned in the Cleveland Wildfire of 1992 and subsequently logged are not included in the following discussion.

1. Maintain a protected activity center (PAC) for all known spotted owl sites, comprised of the best 300-acre block of habitat. No stand altering activities should occur within these PACs, except light fuel treatments. There are seven units remaining within the Cox Canyon Timber Sale. None of these units occur within PACs.
2. Within "Selected Timber Strata" (M4N, M4G, M5N, M5G, M6, P4N, P4G), cut no live tree greater than or equal to 30 inches diameter breast height (dbh), retain 40 percent of the basal area in the unit in the largest trees available, and maintain at least 40 percent canopy closure averaged across the unit. Of the seven remaining units in the Gold Corner Timber Sale, no units occur within "Selected Timber Strata."
3. Within "Other Timber Strata" (most strata not listed under item 2), cut no live tree greater than or equal to 30 inches dbh, and retain 30 percent of the basal area in the unit in the largest trees available. Live trees remaining in these stands must have a cumulative basal area of at least 50 square feet per acre. Of the seven units in the Cox Canyon Timber Sale, all of the units totaling 63 acres occur within "Other Timber Strata." None of these units will meet the recommendations for "Other Strata" because of the size classes of the trees proposed for removal or the amount of basal area proposed for retention.
4. Retain the largest snags greater than or equal to 30 inches dbh up to a maximum of eight snags per acre, averaged over the cut unit. If this does not result in retention of at least 20 square feet basal area of snags per acre, continue adding snags from the largest ones remaining down to a total of eight per acre, or until at least 20 square feet basal area of snags remain, whichever comes first. Snags less than 15 inches dbh or 20 feet tall need not be retained.

The Cox Canyon Timber Sale Contract specifies that all snags except hazard trees be retained; this recommendation, therefore, would be met.

5. Retain at least 10-15 tons per acre of the largest pieces of down wood available, averaged over a harvest unit. The Cox Canyon Timber Sale Contract does not require the removal of sale generated down wood nor the removal of existing down wood; therefore this recommendation would be met.
6. Undertake fuel treatments as necessary to remove surface and ladder fuels and to protect owl habitat. Surface and ladder fuels should be cleared from around all large ( $\geq 30$  inches in dbh) leave trees. Although the Cox Canyon Timber Sale includes fuel treatments, the benefit of these for owls would not be realized because the largest trees would no longer be available.

In November 1993, a Biological Evaluation of the Cumulative Effects of Eldorado National Forest Timber Sales Upon the California Spotted Owl was completed as part of the already-sold timber sale reconsideration efforts. The biological evaluation determined that the Cox Canyon Timber Sale as planned would likely foreclose future management options for the California spotted owl. As part of the reconsideration, an alternative that implemented California spotted owl interim direction was analyzed. The Cox Canyon Timber Sale would result in 439 thousand board feet of volume from 63 acres if California spotted owl interim direction was implemented.

### **Fisher**

In April 1992, the Regional Forester distributed "A Literature Review for Management of the Marten and Fisher on National Forests in California" (Freel 1992), which was to be used in analyses conducted for Forest land management and project planning. In January 1994, using the literature review, the Eldorado National Forest completed a Biological Evaluation of the Habitat Requirements for Fisher on the Eldorado National Forest in Relation to Twenty-Four Sold Timber Sales (Bombay and Foster 1994).

The Cox Canyon Timber Sale was one of the 24 sales analyzed in this evaluation. The evaluation shows that the Cox Canyon Timber Sale would not affect any potential Fisher Use Areas.

### **Late-seral Forest**

An analysis of the amount and location of the late-seral and ecological old-growth forests on the Eldorado National Forest was conducted at the local, watershed and forest scales. The following discussion summarizes several of the important aspects of the late-seral forest ecosystem that were addressed in these analyses.

1. Amount - The Cox Canyon Timber Sale would harvest no fragments (less than 1 acre in size and 2 acres in size) of ecological old-growth forest. Fragments of old-growth exist in the surrounding landscape. Approximately 5 acres of 4G

timber strata and 15 acres of 4N timber strata would be removed in this sale. The existing canopy in the area is not dense. The effect of removing this strata of the canopy would be slight.

2. Fragmentation - No large blocks of late-seral forest would be affected by the sale as designed.
3. Seral Stage Diversity - This analysis addressed only the seral stage 4C-older, which is described in the Eldorado National Forest Land and Resource Management Plan (LRMP). The 4G timber strata was used as a proxy for the 4C-older seral stage in this analysis. Harvest of 5 acres of 4G on the Cox Canyon Timber Sale in combined watershed #17, which currently has an estimated 18% 4G, would maintain the proportion of 4G timber strata in the analysis area above the 5 percent level. Management direction to maintain 5 percent of the later seral stage (Management Practice 55, LRMP) would be met if this sale is harvested.
4. Snags and Down Logs - Based on inventory data, snag densities in most areas meet the LRMP standards and guidelines. It is anticipated that removal of snags during harvest or site preparation activities would not exceed 10 percent of the existing levels. Harvest of the sale is therefore expected to have a slight direct effect upon existing snags within the harvest units. The harvest of this sale would contribute to the downward trend in the availability of large, old trees for large snag recruitment at the stand and watershed scales. The magnitude of the effect at the watershed scale is small.

## **Watershed**

The Cox Canyon Timber Sale is within the Riverton Watershed. The Riverton Watershed is currently at a very high risk for adverse cumulative watershed effects with an existing Equivalent Roaded Area percentage that is above the Threshold of Concern (TOC). This conclusion was based on the numerical analysis of the past land disturbance history, including the effects of the Cleveland wildland fire in 1992. The future foreseeable activity in the Riverton Watershed, such as the private land logging, the Whale Rock project and the Cox Canyon Timber Sale, could potentially raise the numerical risk rating further.

The Cox Canyon Timber Sale would have only a minor effect upon the overall watershed ERA; however, since the existing ERA is considered to be very high, the concern over cumulative watershed effects does exist.

## **Economics**

A Socioeconomic Analysis of Twenty-Four Sold Timber Sales on the Eldorado National Forest (Baumbeck) was completed in May 1994. According to this analysis, the estimated damages from cancellation for the Cox Canyon Timber Sale are approximately \$191,000.00.



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## **APPENDIX J**

### **MONITORING PLAN FOR THE WHALE ROCK PROJECT AREA**

ELDORADO NATIONAL FOREST

PACIFIC RANGER DISTRICT

Whale Rock Monitoring Summary			
Objective	Method	Timing/Frequency	Ait
<p><b>Wildlife</b> : To ensure that management practices contribute to habitat improvement and population viability.</p> <p><u>Implementation Monitoring</u></p> <p>To determine if trees selected for harvest comply with proposed CASPO prescriptions.</p>	<p>Review timber marking as an on-going activity. Ten percent of units will be field reviewed to verify tree selection, basal area retention and canopy closure after marking and before sale. Monitoring will be responsibility of District Timber Management Officer and District Wildlife Biologist.</p>	During project preparation	B-E
<p><u>Effectiveness Monitoring</u></p> <p>To determine habitat use and habitat condition for the spotted owl and goshawk.</p>	<p>Spotted owl: Monitor PACs ED-036, 040, 051, 053, 069 and 216 using Regional survey protocols by District Biologist.</p> <p>Goshawk: Monitor GMA 501 and 502 using Regional survey protocols by District Biologist.</p>	During and after project completion.	B-E
<p><b>Sensitive Plants</b> : To ensure that management practices maintain or enhance population viability and habitat needs.</p> <p><u>Implementation Monitoring</u></p> <p>To determine if mitigation measures are implemented as designed and specified in project NEPA documents.</p>	<p>Field visits to all known sensitive plant locations within the project area, requiring ocular observations of practices and measures implemented, documented on monitoring forms and photos.</p> <p>District botanist is responsible.</p>	During and after project completion.	B-E
<p><u>Effectiveness Monitoring</u></p> <p>To determine if mitigation measures are effective in meeting the goals, objectives, standards and guidelines as stated in Eldorado National Forest Land and Resource Management Plan and Forest Service Manual (FSM 2670). To verify predicted project effects determined in project NEPA document.</p>	<p>Field visits to all known sensitive plant locations within the project area and within vicinity of activities. Ocular observations of practices and measures implemented, documented on monitoring forms and photos. District botanist is responsible.</p> <p>Field visits to 25% of all known Pleasant Valley mariposa lily plant locations within the project area and in vicinity of activities. Specific counts of sensitive plant individuals within occurrences, documented on monitoring forms. Field visits to selected known occurrences of yellow bur navarretia, requiring ocular observations of percent cover of sensitive plant individuals within occurrences, documented on monitoring forms. District botanist is responsible.</p>	<p>During and after project completion.</p> <p>Prior to and after project implementation between April-June for 2 years after project completion.</p>	B-E



Whale Rock Monitoring Summary (continued)			
Objective	Method	Timing/Frequency	Alt
<p><b>Cultural Resources</b> : To ensure that management activities leave cultural sites undamaged, as specified in project NEPA documents.</p> <p><u>Implementation Monitoring</u> To determine that significant cultural resource sites are avoided during project activities. To determine if mitigation measures are implemented as designed and specified in project NEPA documents.</p>	Field visits to sites within 50 meters of project activities. District Archaeologist is responsible.	On-going, commensurate with completion of activities.	B-E
<p><b>Hydrology</b> : To assess the efficacy of the water quality protection measures applied on project to ensure protection for the beneficial uses of water.</p> <p><u>Implementation Monitoring - Administrative Evaluation</u> To determine if adequate water quality protection measures have been considered in planning and project design of timber sales and road layout.</p> <p><u>Implementation - On Site Evaluations</u> To determine if selected BMPs have been implemented as designed to protect water quality and to determine effectiveness of BMPs.</p> <p>a. Streamside Protection Zones b. Skid Roads/Trails c. Special erosion control and revegetation d. Road surface, drainage and slope protection e. Stream crossings</p> <p><u>Effectiveness Monitoring</u> To determine if changes occur to channel morphology or the magnitude of effects of aquatic invertebrates within watersheds over TOC.</p>	<p>R-5 BMP Evaluation Program, Form AE-1 to be completed by Forest Hydrologist.</p> <p>R-5 BMP Evaluation Program to be completed by Forest Hydrologist and/or District Sale Administrator.</p> <p>Form T01 Form T02 Form T06 Form T08 Form T09</p> <p>California Stream Bioassessment Procedure, based on EPA's rapid bioassessment procedure.</p>	<p>Once following sale closure.</p> <p>At least one winter season following harvest and one winter season following post-sale activities for each BMP</p> <p>Prior to harvest activities and at least one winter following initial harvest, early summer every 2 years until 2005 (1-2 sites per watershed and 6-8 samples per site.</p>	<p>B-E</p> <p>B-E</p> <p>B-E</p>

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## **APPENDIX K**

### **SUPPLEMENTAL INFORMATION FOR CULTURAL RESOURCES MANAGEMENT FOR THE WHALE ROCK PROJECT**

ELDORADO NATIONAL FOREST

PACIFIC RANGER DISTRICT



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## APPENDIX K

### Cultural Resource Management

All activities in Whale Rock will comply with the National Historic Preservation Act (NHPA) and its implementing regulations (36 CFR 800), and other pertinent laws and regulations. Compliance will be directed by the Memorandum of Understanding (MOU) between the Eldorado National Forest and the California State Historic Preservation Officer (SHPO) and any Programmatic Agreements in place between the SHPO and the Eldorado National Forest at the time projects are implemented. These documents provide for standard methods of treatment of cultural properties.

Although all the sites in activity areas could be protected by flag-and-avoid measures, it is not considered practical or advantageous to treat all the properties through avoidance. Seven sites, which are situated in areas where complete preservation would be difficult in the long term (i.e., sites bisected by roads, or sites located in previously established clearcuts), will be evaluated. These sites are FS No. 05-03-55-30, -64, -136, -281, -282, -283 and -357. The integrity of the sites (which include three prehistoric, two historic and two sites with mixed components) has been compromised in the past and continued protection for them will be difficult to maintain due to their location.

These seven sites will be scientifically tested for their research values as per the strategies outlined in the Framework for Archaeological Research and Management on the National Forests of the North-Central Sierra Nevada (FARM; Jackson et al. 1994). This work will be conducted in consultation with local Native American groups or traditional users of the area and in concurrence with the State Office of Historic Preservation. The evaluation will involve close inspection of the ground, some subsurface excavation, metal detecting, and archival research, as appropriate. Field investigations will involve placing a number of shovel transect units (STUs) across the sites. The STUs are generally 50 x 100cm, excavated in 10 or 20cm increments to assess the presence, type, or absence of cultural materials. Cultural material will be analyzed in the field, and all non-diagnostic material will be returned to the STU from which it was obtained. The dirt will then be returned to the holes and duff replaced on the surface at the close of the investigations. Upon completion, a report documenting the findings will be prepared and submitted to the State Office of Historic Preservation. Additional details regarding the sites, management contexts, and minimum number of STUs planned at each are included in the attached Table.

If any of the seven sites are determined to have high research values or to be eligible for inclusion in the National Register of Historic Places, they will be flagged and avoided during the Whale Rock project. If found to have low values and to be ineligible for listing in the National Register, they will be released from management, or conservation measures will apply, such as interpretation. Conservation will allow project activities to occur on the site, while conserving some of the site's cultural components.

Archaeological properties have inherent value in reflecting past land use, lifeways, and environmental or ecosystem management. The Whale Rock project provides an opportunity to evaluate and interpret some of these sites, and to increase the public appreciation for prior land use in this region of the Sierras. Interpretive signing is currently planned for FS No. 05-03-55-64. This collapsed historic cabin and hydraulic mine are associated with one of the early Euroamerican homesteaders in the area. In addition to increasing the quality of public education and enjoyment, information obtained through evaluation would contribute to the advancement of knowledge and understanding of the area's cultural history and would aid in addressing research questions important to regional researchers.

Any sites *not evaluated* for their significance will be avoided during ground-disturbing activities. Avoidance, as stipulated in the MOU, is accomplished by:

- a. assuring that all areas to be subject to ground disturbance are adequately inventoried in order to identify all archaeological and historical sites; at present, inventories in Whale Rock are considered adequate to have located the resources predicted to be present in the project area;
- b. recording and mapping all identified sites to professional standards; adequately designating identified sites so they can be physically avoided during project implementation; and
- c. monitoring during and after project implementation to assure that sites have been avoided.

The MOU also states that in the event that a site cannot be avoided or reasonably protected, the treatment program outlined in 36 CFR 800 and Section 106 of the NHPA will be followed to mitigate the potential effects. In this case, and in consultation with SHPO and the Advisory Council on Historic Preservation, the Eldorado National Forest is required to:

- a. consult with contemporary groups who have historic ties to the landscape;
- b. evaluate the site to determine its eligibility to the National Register of Historic Places;
- c. if eligible, address adverse effects to eligible properties through a mitigation plan; after completion of the mitigation measures, project activities would proceed; or
- d. if not eligible, the area would be made available for other resource activities.

By following the above procedures, none of the alternatives will have an effect on cultural resources. Additional management actions, management opportunities, and/or mitigations specific to each alternative are discussed within the relevant alternative description.



Archaeological Sites Scheduled for Evaluations on Whale Rock

FS Site No. 05-03-55-____	Archaeological Resource Class	Management Context	Site Condition	Desired Condition/Use	Treatment Options
30	Cabin; sparse lithic scatter	Partially located within plantation; covered with slash and deadfall; crossed by FS Roads 11N26Y and 11N26YA.	Poor	Release from management - Cabin is collapsed, lithics may be associated with site 05-03-55-283. Collect data for use in area interpretation offsite. Light pre-haul road maintenance scheduled for 11N26Y and 11N26YA. Harvest within standing timber on cabin site desired.	Metal detect historic locus. Place minimum of 10 STUs on site. Conduct lithic analysis to determine chronology, technology, and possible relationship of lithic material to site 05-03-55-283. Conduct archival research for information on historical use of cabin.
64	Cabin, trash scatter, hydraulic mine, ditch	Cabin/ditch locus in area covered with deadfall and slash; fuels reduction, prescribed burning scheduled; FS road 10N64.4 crosses between mine and cabin locus.	Mine- good; ditch- primarily poor; cabin- collapsed and poor condition	Conservation/Interpretation - An interpretive sign is planned for here describing the mining activities and the original homesteaders. Hand piling of slash and deadfall around the cabin area to reduce fuels, then burning piles. Light pre-haul maintenance scheduled for road 10N64.4.	Update site record with information regarding the ditch system. Additional archival information needed, particularly regarding ditch and mining claim.
136	Bedrock milling station/lithic scatter	FS roads 11N73 and 11N56A, and a cut-off between the two roads, cross through the site. Site is on small area of exposed lava cap within a general harvest and prescribed burn area. Road work (maintenance and reconstruction) is planned in site area and vicinity. Portion of site dozed in past.	Good	Conservation - Complete protection of lithic component of site will be essentially impossible. Collect data for use in regional research and interpretation. Allow maintenance on roads, while protecting bedrock mortar locus.	Place minimum of 10 STUs on site. Conduct lithic analysis to determine chronology and technology/reduction sequences.
281	Historic trash (possible cabin site)	In area proposed for fuels reduction through harvest and prescribed burning.	Poor	Release from management - Retired FS personnel reported running over a cabin at this location with a skidder over a decade ago. Has been prescribed burned numerous times as part of a bear clover rejuvenation study area. Collect data for use in off-site interpretation of historic use of area. Reduce fuels through harvest and prescribed burning.	Metal detect for additional historic materials. Place minimum of 4 STUs on site. Determine age of material. Conduct archival research to determine historical use of the area.
282	Lithic and groundstone scatter	Within a plantation revegetated following a 1987 clear-cut. Fuels reduction through harvesting is scheduled in immediate site vicinity.	Poor	Release from management - Site is in the center of a young plantation now overgrown with brush. Area has been logged, site-prepped and planted. Future brush management and fuels reduction is desired. Collect data for use in regional research.	Place minimum of 20 STUs on site. Conduct lithic analysis to determine chronology and technology/reduction sequence. Test for subsurface deposits. Check that cultural materials are limited to the plantation and do not extend into nearby timbered stand where harvesting is scheduled.

283	Lithic and groundstone scatter.	Primarily located within a clear-cut and young plantation; area surrounding site scheduled for fuels reduction through harvesting and prescribed burning; FS road 11N26YA will be used to access the fuels reduction area, and the landing adjacent to the site will be used during harvest operations; prehaul maintenance is scheduled for the road.	Poor	Release from management - site has been heavily impacted from clear-cut logging operations, and future vegetation management is desired in the plantation. Fuels reduction through harvesting is desired in immediate site vicinity with use of road and landing at site desired. Collect data for use in regional research questions.	Place minimum of 20 STUs on site, testing for subsurface deposits. Determine if cultural deposits are situated on FS road 11N26YA and the landing. Conduct lithic analysis to determine chronology, technology and possible relationship of materials to site 05-03-55-30. Update record as appropriate.
357	Historic trash scatter; bedrock milling station/ sparse lithic scatter.	Within area of proposed fuels reduction through harvest and prescribed burn; FS road 11N60A crosses site and is scheduled for reconstruction; area grazed and extensively logged in past.	Fair	Conservation - Protect bedrock milling station from project activities. Collect data from lithic locus and allow road reconstruction to proceed.	Place minimum of 12 STUs on site. Conduct lithic analysis to determine chronology and technology/reduction sequences. Conduct archival research to determine historical use of area. Assess potential of area for future interpretation.

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